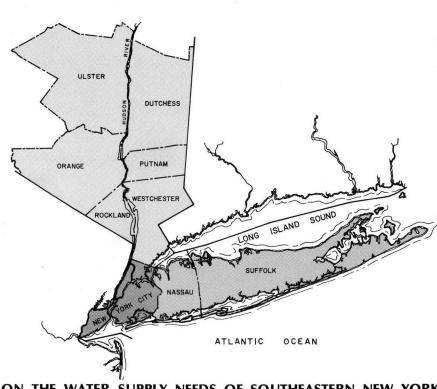
WATER FOR TOMORROW RECOMMENDATIONS OF THE COMMISSION



TEMPORARY STATE COMMISSION ON THE WATER SUPPLY NEEDS OF SOUTHEASTERN NEW YORK

LETTER OF TRANSMITTAL

TEMPORARY STATE COMMISSION ON THE WATER SUPPLY NEEDS OF SOUTHEASTERN NEW YORK

December 15, 1973

The Honorable Nelson A. Rockefeller Governor of New York State Albany, New York

The Honorable Perry B. Duryea, Jr. Speaker of the Assembly The Capital Albany, New York The Honorable Warren M. Anderson Temporary President of the Senate The Capital Albany, New York The Honorable Henry L. Diamond Commissioner Department of Environmental Conservation 50 Wolf Road Albany, New York

Dear Sir:

The final report of the Temporary State Commission on the Water Supply Needs of Southeastern New York is herewith submitted in accordance with the provisions of Chapter 593 of the Laws of 1969, as amended, which established the Commission.

The mission of the Commission as set forth in the statute was to:

- Make a study of the future water supply needs of the southeastern portion of the state of New York, including the city of New York and the counties of Nassau, Suffolk, Westchester, Rockland, Putnam, Orange, Ulster, and Dutchess and the relationship of these needs to the water resources available both within and without such portion of the state to fulfill such needs;
- 2. Make a study of alternative methods for construction, financing, administering the needed water supply facilities;
- 3. Make specific recommendations directed toward meeting the water supply needs of such southeastern portion of the state, including, but not limited to, recommendations as to:
- a. alternatives for the development of additional water supply facilities, and
- b. alternatives for financing and administering the construction, operation and maintenance of the facilities, including governmental structures and a delineation of the areas of proper state and local responsibilities;
- 4. Make specific recommendations as to the alternatives in view of the projected needs, potential effects on existing water supplies and on other communities of the state, potential effects on conservation and natural beauty, and projected costs of the alternatives presented.

The program of the Commission consisted of public meetings and conferences with local officials, state agencies, public interest groups, other states, and federal and interstate agencies, in-depth studies and analyses, by the staff and Commission members followed by public hearings throughout the study area and the development of final recommendations.

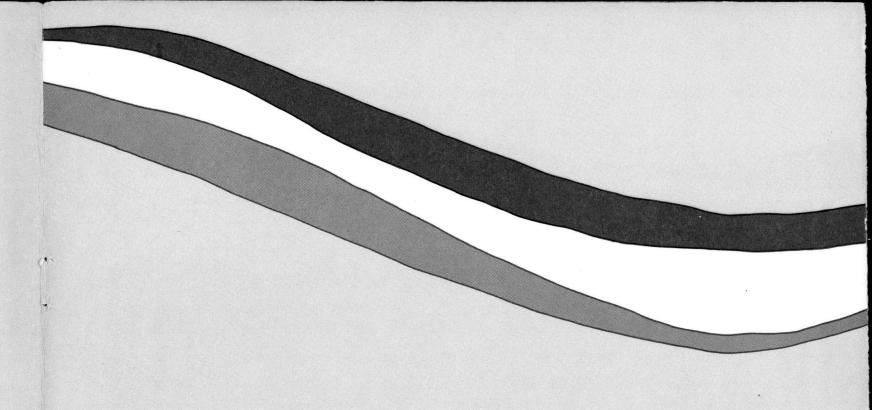
Some thirty-four formal conferences and hearings were held, and nine background reports, covering technical matters, other reports and studies proceedings of conferences and hearings, and status of work, were published as Commission documents. The final report, a summary of which is presented here, consists of some six Commission documents totaling approximately 1000 pages.

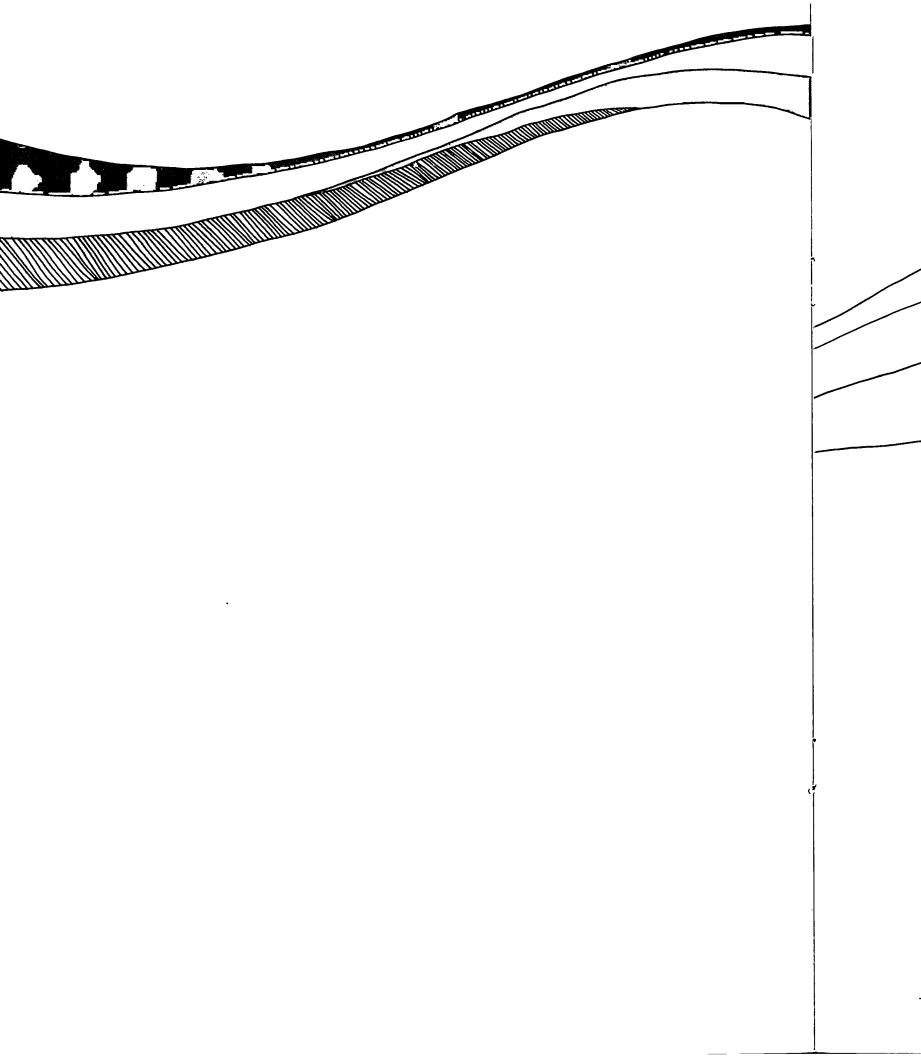
The Commission took full advantage of all existing and current studies, particularly the Comprehensive Water Supply Studies funded by the state. Furthermore, close contact and liaison were developed and maintained with state, federal and local agencies, and other interests whose cooperation and assistance were outstanding.

The summary of the final report is a distillation of the Commission efforts. It presents in abbreviated form the conclusions and recommendations of the Commission. We strongly urge that the recommendations be immediately implemented in order that the water supply needs of the Southeastern New York region will be met in an effective, efficient, economical and timely manner, with proper consideration for resource and environmental values and concerns.

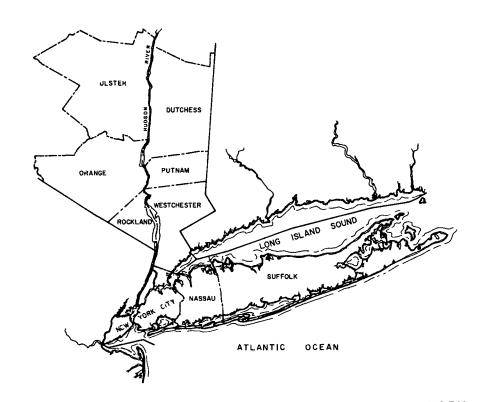
Respectfully submitted,

E. Virgil Conway Chairman

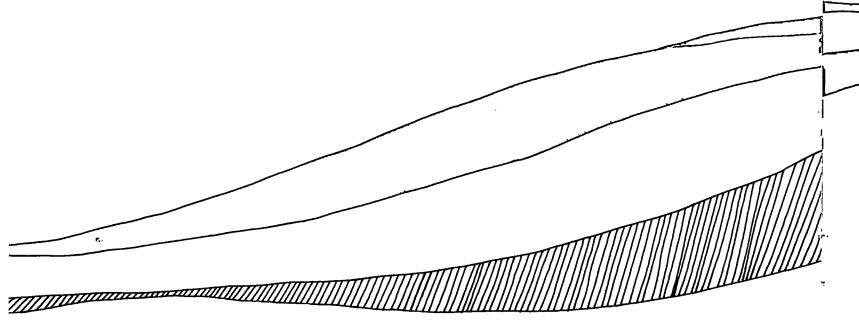


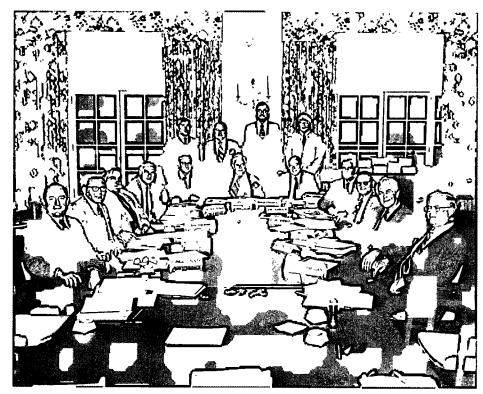


WATER FOR TOMORROW RECOMMENDATIONS OF THE COMMISSION



TEMPORARY STATE COMMISSION ON THE WATER SUPPLY NEEDS OF SOUTHEASTERN NEW YORK





Commissioners: seated left to right

E. Virgil Conway, Chairman, H. Clark Bell, Vice Chairman, Louis Ingrassia, Anthony M. Quartasaro, Jeremiah R. Dineen, substituting for James C. Harding, Herman Forster, George J. Farrell, Ir., Gerald R. O'Brien, William J. Schickler, Neil H. Anderson, Robert D. Hennigan, Executive Director.

Staff: standing left to right

David E. Bverle, Emmanuel Bund, Paul W. Merkens, Harold F. Breon

THE COMMISSION

E. Virgil Conway, Chairman

Chairman and President, Seamen's Bank for Savings, New York City. Attorney.

H. Clark Bell, Vice Chairman

Assemblyman 99th District, Ulster Attorney, Kingston, Ulster County.

Neil H. Anderson

Executive Vice President, New York Board of Trade, Inc., New York City.

George J. Farrell, Jr.

Assemblyman 21st District, Nassau County.

Attorney, Nassau County

Herman Forster

Conservationist.

Vice Pres. Association for the Protection of the Adirondacks

President, Conservation Council Foundation.

Formerly President, Chairman of the Board, Conservation Council of New York State, Inc.

Formerly Commissioner, Division of Water Supply, New York City. Attorney

Albert F. Gordon

Vice President, Kidder, Peabody and Company, New York City. Financier

Anthony B. Gioffre

Accountant, Attorney, Port Chester, Westchester County. Formerly Senator 35th District, Westchester County.

James C. Harding

Consulting Engineer. Formerly Commissioner of Public Works, Westchester County. Professional Engineer

lease" based on a safe yield being in excess of consumption. Safe yield is the amount of water a system can deliver based on the worst drought year of record.

Furthermore, the excess release requirements tend to be counter-productive to any water conservation program employed in New York City, because 83 per cent of the "saved" water must be released downstream.

In any case, it should be noted that the excess release requirement was predicated on the drought of the 1930's, then the worst on record. Recomputation of the safe yield of the New York City system based on the drought of the mid-1960's has found it to be actually 1,279 MGD, rather than 1,665 MGD. This should be used as a basis for a petition to change the excess release requirements.

THE STATE ROLE

- 34. The current application of the Department of Environmental Conservation to the Water Resources Council for financial assistance to develop a water resources management plan for the Hudson River Basin and ported.
- 35. Federal, interstate and state government roles in water supply should be restricted to research, data collection, planning, regulatory and financial assistance functions. All water supply services facilities design, construction and operation should remain at the regional and local levels.

The waters of New York State are the property of the State held in trust for the benefit of the people of the State. The authority of the State to manage and regulate the use of water resources is derived from the State Constitution. This authority has been reaffirmed by a number of statutes establishing a large number of programs and policies.

However, like the Federal government, the State has not been extensively involved in water supply activities. Its programs and policies have developed in an ad hoc fashion, and its programs have been primarily regulatory. Design, construction and operation of water supply facilities have taken place exclusively at the local level.

The Departments of Health and Environmental Conservation have the greatest authority over water supply services. The thrust of the Department of Health's activities is in planning and regulation to insure safe, palatable water at the tap.

DEC is most influential in regulation and water supply allocation.

These powers are by no means total. DEC's water supply allocation authority extends only to public water supply, not to other purposes such as irrigational or industrial use, except in the case of withdrawals from the Long Island aquifer exceeding 43 gallons per minute.

Moreover, the actual services provided by municipal water suppliers, and the rates charged by them, are regulated by no State agency. Only investorowned water systems are subject to rate and service regulation, by the Public Service Commission, although even here effective regulation of services has been difficult.

Beyond regulation, the State's role in the region's water supply has been most prominent in its financing of Comprehensive Public Water Supply (CPWS) Studies for all the region's counties ex-Long Island is endorsed and sup- cept Dutchess, which had already conducted its own

The impact of these studies and, in fact, of the State's more general water resources planning activities for the most part, has eluded southeastern New York. The CPWS Studies were to be coordinated with regional water resources planning boards. In southeastern New York, there are no such boards and no mechanism to implement the studies' recommendations. Indeed, in this region, with two-thirds of the State's population, there is no state water resources planning program.

The state is attempting to remedy this serious gap. The DEC currently is applying for federal funds to develop a water resources management plan for the Hudson River basin and Long Island.

In general, the federal, interstate and state roles of research, data collection, planning, regulation and financial assistance are appropriate to those levels of government. Executed properly, these roles can have a positive impact on the design, construction and operation of water supply facilities at the regional and local levels. In the past, these functions, such as water resources planning, have not been effective in southeastern New York. This has contributed to, or at least has not discouraged, the fractionalization of water supply services at the local

carried out in cooperation with the time, however, municipal water supply

use must be developed in recognition of other legitimate uses and interests.

THE FEDERAL ROLE

- 30. All federal water resource programming in New York State should be carried out in close cooperation and as joint endeavors with the appropriate agencies of the State of New
- 31. The cooperative U.S.G.S.—state data collection and analysis programs should be continued and expanded where necessary. An expansion of the program is indicated for the Hudson River Basin and Long Island.
- 32. The final recommendations of the federal Northeastern Water Supply Study (NEWS) should be closely coordinated and integrated with any state or regional planning proposals in order to make best use of the financial capabilities and water resources available to meet the water supply needs in the southeastern re-

Though the Federal Government's participation in water supply matters has been until recently quite limited it has historically been involved in many other aspects of water resource development and regulation. Activity has been concentrated on navigation, flood control, hydroelectric power generation and harbor and shoreline management. Most of that activity, however, has taken place in other parts of the country. More recently the Federal Government has become dominant in water pollution abatement policy and programming through passage of P.L. 92-500.

One long-term Federal program directly related to water supply has been the hydrological data collecting programs of the United States Geological Survey (U.S.G.S.), programs which are eral Government will at this time or in the

State. Responsibilities of the U.S.G.S. include the determination of the quantity and quality of both surface and underground water sources. The agency has been particularly active on Long Island where it has studied the matters of waste water pollution and salt water intrusion of the aguifers. Data compiled by the agency has been and doutlessly will continue to be of great value to those involved in water supply matters.

The Federal Government has recently taken a giant step toward entering the water supply field. The Water Resources Planning Act of 1965 authorized the U.S. Army Corps of Engineers to conduct a study of the water supply situation in the Northeastern United States and to make recommendations for solving any problems. One of its main areas of study is the New York metropolitan area, including northeastern New Jersey and southwestern Connecticut.

The Corps has published a number of studies-engineering, institutional and environmental-which might well lead to significant changes in the water supply picture of southeastern New York. The most significant possible change would be the involvement of the Federal Government through the Corps in the construction and perhaps operation of new water supply sources in the Hudson River Basin. The Secretary of the Army has been given authorization by Congress to construct and operate facilities if such a recommendation is made in the Northeastern United States Water Supply (NEWS) Study. But heavy involvement in water supply in the New York metropolitan area might well herald calls for increased Federal participation elsewhere. Therefore, despite the fact that the Corps seems to be leaning toward a recommendation for a bi-state (New York and New Jersey) solution by extracting water at West Park, New York, on the Hudson River, it is questionable whether the Fednear future actually carry through with such a project.

A bill presently before Congress would thrust the Federal Government further into the water supply field. The bill-The Safe Water Drinking Actwould bring all public water supplies serving more than 40 people under the jurisdiction of the Environmental Protection Agency. Under the proposal EPA would be required to set standards for water quality, aesthetically pleasing drinking water, bottled water, and the operations, maintenance and construction of public water supplies. However, it does not call for direct Federal participation in the planning, construction or operation of public water supply systems. At this writing the bill has only passed one House of Congress.

INTERSTATE CONSIDERATIONS

33. In order to encourage conservation measures and universal metering in the southeast New York region, New York State should immediately commence action in cooperation with the Delaware River Basin Commission to eliminate the "excess release" requirements imposed on the city of New York.

The most important interstate arrangement affecting the water supply situation in southeastern New York grew out of New York City's impoundments and diversions of Delaware River water into the City. Protests by downstream states led to Supreme Court decrees in 1931 and 1954 allocating the rivers waters to New York City and the downstream states. According to the 1954 Supreme Court decree, New York City is allowed to use up to 800 MGD for water supply purposes. The Delaware River Basin Commission has institutionalized the Supreme Court decrees.

As a condition of this use of the Delaware, New York City is required to release from its storage reservoirs enough water to maintain a stream flow of 1,750 cfs at Montague, New Jersey, at all times. Moreover, it is required to release a quantity of water equal to 83 per cent of the difference between its annual water consumption from all sources and the safe yield (1,665 MGD) of its total gravity supplies. This is the so-called "excess re-

Louis Ingrassia

Assemblyman, 98th District, Sullivan and Orange Counties. Farmer and Real Estate Dealer.

Jess J. Present

Senator, 57th District, Allegheny, Cattaraugus, Chautaugua and Erie Counties.

Anthony M. Quartararo

Civil Engineer Attorney, Poughkeepsie, Dutchess County.

Gerald R. O'Brien

Union Carbide Corporation, Inc., New York City. Attorney, West Nyack, Rockland

County.

Jay P. Rolison, Jr.

Senator, 39th District, Dutchess, Putnam, Columbia and Westchester Counties.

Attorney, Poughkeepsie, Dutchess County.

John J. Santucci, Jr.

Senator, 10th District, Queens County.

Attorney, New York City.

William J. Schickler

Assistant General Manager and Chief Engineer, Suffolk County Water Authority.

Professional Engineer.

STAFF FORMER

Benjamin A. Gilman

COMMISSIONERS*

Congressman, 26th District. Formerly Assemblyman, 95th District, Orange County. Attorney.

Thomas S. McInerney

Businessman, Yonkers, Westchester County. Formerly Assemblyman, 87th District, Westchester County.

Robert C. Wertz

Assemblyman, 4th District, Suffolk County. Attorney, Smithtown, Suffolk County. *Until 1972

Executive Director-Robert D. Hennigan Special Counsel—Emanuel Bund Public Affairs-Irene W. Baker Administrative Ass't-David A. Duffy

ENGINEERING STUDIES

PROFESSIONAL

Director—Paul W Merkens Ass't Director-Stephen C. Lackey Engineer—Harold F. Breon

MANAGEMENT STUDIES

Director-David E. Buerle Staff Attorney-Robert Redmond Research Ass't-Jeffrey H. Brewer Research Ass't-Robert C. Hansen

PRINCIPAL CONSULTANTS

John C. Geyer, Consulting Engineer, Professor, Johns Hopkins University, Baltimore, Maryland.

Edward H. Buckley, Biologist, Boyce Thompson Institute, Yonkers, New York.

Murray M. McPherson, Director, Urban Water Resources Study Project, American Society of Civil Engineers. David I. Allee, Economist, Professor, Cornell University, Ithaca, New York.



WATER SUPPLY INTEREST

Water supply development and management have been of intense interest to local officials and professionals in the southeastern section of New York State for decades. This sustained interest is due to the absolutely vital nature of an adequate water supply for domestic and **Institutions** industrial use; particularly in southeastern New York, which includes the highly concentrated population of the City of New York and the expanding population of the eight suburban counties of Nassau, Suffolk, Westchester, Putnam, Dutchess, Rockland, Orange and Ulster.

The development and administration of water supply for this metropolitan New York area have always been a challenge in the face of ever-burgeoning growth, increasing per capita water usage, water quality concerns, the multiplicity of local government institutions, the intergovernmental and interstate aspects, the limited water resources, and the cost of developing water facilities.

Periodically, extraordinary conditions have caused water supply matters to become of great concern to the general public, This usually is the result of drought or, as has been the case at times, of population growth simply outstripping the available supply.

THE SETTING **Population**

The issue of water supply for southeastern New York is one of the more complex issues of the region and the state. One facet of this complexity is the absolutely vital nature of water supply for domestic and industrial use in the State's largest metropolitan area. Another facet is the rapid population growth. The area has increased in popu- people. The systems are both local and lation from 5.8 million to 12.2 million in the past 50 years, with yet another 4 to 6 and surface water sources, many of the million increase forecasted for the next 50 years. Furthermore, the problems go well beyond New York City. From 1915 to source in the region is on Long Island.

1970 as the city's population increased 1.6 times, the population of the region increased 2.1 times and the suburban population 5.3 times. New York contained 86 per cent of the regional population in 1915, but by 1970, only 64 per cent lived in the City. This changing distribution is expected to continue with New York City's share of the regional population dropping below 50 per cent by the year 2020.

The institutional framework for this growing population has been a multitude of governmental entities. There are 279 units of local government in the region including New York City, 8 counties, 13 cities, 103 towns, and 159 villages. Water is supplied by more than 619 water systems owned and operated by cities, towns, counties, villages, private individuals and corporations.

These many institutions and systems operate under a variety of laws, rules and regulations that have changed only slightly in the past half century. The only changes in the structure of local government have been the development of special improvement districts and the increasing activities of county governments. The boundaries of municipalities have become rigid while population growth and urbanization have proceeded without regard to boundaries.

The institutional problems of water supply in the region are set against the spiraling increase in water use, the limited available water resource, the deteriorating quality of water, and the growing concern over environmental matters.

Metropolitan Water Supply

Southeastern New York is served by a number of water supply systems ranging from the New York City system which serves 7.8 million people to small subdivision systems which serve less than 100 regional in scope and draw upon ground sources being outside of the study area.

The most significant groundwater re-

This groundwater resource is used for water supply and wastewater disposal by over 3 million people in Queens, Nassau and Suffolk Counties Groundwater is also of great significance in Rockland County, furnishing some two-thirds of all water used for water supply purposes in the County. Local groundwater supplies are common in the other parts of the region, but are of relatively small yield and of no great significance for regional purposes. They are of great importance for scattered areas and individuals throughout the region.

The New York City system is the largest surface water system in the region. It draws from reservoir complexes on the Croton, Catskill and Delaware drainage basins located in Sullivan, Delaware, Schoharie, Ulster, Orange, Greene, Putnam and Westchester counties. Aside from New York City, 51 other water systems, mainly in Ulster and Westchester counties, obtain their water from the city system, 600,000 people outside New York City are thus served by the city system. The basic controlling statute for this regional water supply system is the Water Supply Act of 1905. It was originally designed solely for New York City, applies only to upstate surface water development, and has undergone little change since being enacted.

Local surface water supplies are used extensively in the counties bordering the Hudson River. Most are within the respective county boundaries and are very significant in meeting local needs.

Increasing Concern

In the mid-sixties a series of developments raised the issue of water supply to the highest levels of governmental and public interest. The growing population and increasing water use, the enactment of the Pure Waters program, the rising concern with the quality of life and effective environmental management, the need for new investment in water facilities and the deteriorating quality of the water resource all contributed to this water supply concern.

All of these issues were exacerbated and brought sharply into focus by the severe drought of the mid-sixties which hit the Northeastern region of the country. Wells ran dry; reservoirs were depleted; streams dried up. Emergency

Water supply is only one of a number of different uses to which water can be put. Some water sources are used for more than one purpose. Often such uses are conflicting, as when flood control considerations dictate significant variations in the water level of reservoirs, to the dismay of recreational interests. Despite the many uses of water, it is ning stage is still quite speculative. important to keep in mind that the premier use is for public water supply.

In the past, responsibility for water supply development has rested with local institutions, primarily municipalities. Federal participation has been limited mostly to technical and financial assistance. The State has been involved primarily in a regulatory role. Interstate considerations of significance have been restricted to the rules governing New York City's use of an interstate waterway, the Delaware River, and the operations which result from such use. Federal and state responses to water related problems have developed on an ad hoc basis.

INTRODUCTION

The State has become more involved through its sponsorship of Comprehensive Public Water Supply (CPWS) studies. Most of these studies have been carried out for counties of the State, including all but one of the counties in southeastern New York. The exception—Dutchess County—conducted its own study. Unfortunately, no mechanism for implementation of the studies' recommendations yet exists in southeastern New York.

The Federal Government spurred by the drought of the mid-sixties, has moved

Northeastern United States Water Supply (NEWS) Study will include recommendations, both technical and institutional, to solve water supply problems in the New York metropolitan area. It will probably emphasize bi-state or multi-state solutions. The United States Corps of Army Engineers has been given the authority to finance, construct and operate any recommended facilities, though the likelihood of involvement beyond the plan-

Water supply is not water's only use. Water supply is but one use, albeit the premier use, that falls under the umbrella term of water resource management. There are in fact many water-related needs and demands. They can be broadly categorized as follows:

- 1. In place surface water use-navigation, hydropower, waste water disposal, stock watering, fishing, recreation, aesthetic enjoyment.
- 2. Out of place surface water usesuch uses as public water supply, industrial water supply and irrigation where the water is removed from a stream or lake to be used elsewhere.
- Protective measures—flood control and drought control through stream regulation.

It should be noted that underground water sources can also be used for such purposes as public and industrial water supply, irrigation and waste water dis-

In many cases water sources are used for more than one purpose. In fact, mulin southeastern New York are quite common. For example: Long Island vigorously into the water supply field. Its groundwater is used both for water sup- meet basic human needs. At the same

ply and waste water disposal purposes. The water of the upper Delaware River basin is transferred to New York City for water supply purposes. And water from the Mohawk-Hudson Rivers as well as the Delaware River is used for public water supply, industrial water supply, waste water disposal, navigation, hydroelectric power, flood control, fishing, recreation and aesthetic enjoyment.

AND STATE ROLES

CHAPTER 7

PUBLIC POLICY—FEDERAL, INTERSTATE

Unfortunately, however, one use of water may totally or partially restrict another use Historically, in water-rich eastern United States, water used for water supply purposes has excluded its use for other purposes. Reservoirs within the New York City water system are singlepurposes reservoirs. But increasing suburbanization of the upstate counties has resulted in increasing pressure for recreational use of these reservoirs.

One very important and recurring multiple use of water sources is for water supply and for waste disposal. These two elements of the urban water utility system are in fact inseparable. Water delivered for water supply use becomes wastewater to be disposed of. Public policy in one area immediately impacts on the other. These two uses are separated only by the small air gap between water tap and drain. This relationship is most obvious in Long Island where water supply and waste water disposal are simultaneous uses of the groundwater reser-

Thus, water supply is one demand among several on the available surface and groundwater resources. It is recognized by law and common sense to be the premier demand. As such it requires tiple uses of many of the water sources an adequate quantity of water of acceptable quality at the point of taking, be it a stream, a river, a lake or groundwater, to safety factor for indirect reuse. In addition it is thought that the movement of the treated wastewater through the groundwater aquifer would give additional filtering to the water and remove those contaminants not removed by the treatment process.

Indirect reuse on Long Island has the advantage of making use of the existing storage in the aquifer It would slow down the lowering of the groundwater table and enhance environmental considerations.

Indirect reuse through grouundwater recharge has been suggested by the New York State Department of Environmental Conservation in hearings held by the Department of Environmental Conservation it was found that the public is in a position to accept indirect reuse as a source of water supply for the Long Island counties.

With these considerations, it is recommended that indirect reuse of recycled wastewater proceed in Nassau County. The first step would be the construction and operation of a research pilot plant to develop the necessary skills and expertise required for wastewater recharge into an aquifer.



measures were taken in southeastern New York to stave off disaster. Educational programs were undertaken, water use restrictions were enacted prohibiting lawn sprinkling, car washing, street washing, public fountains or any other unnecessary use of water. Conservation measures were undertaken calling for leakage control, recycling of water, and development of private wells. Emergency supplies were put into use, the most dramatic being the use of the Hudson River at Chelsea. The drought ended in 1967 and the water supply crisis eased. However, things would never be the same since current policies for water supply management and development were brought under critical scrutiny by the State and Federal governments.

Federal Interest

The Federal response was the Water Supply Act of 1965 which called for a study by the Corps of Engineers. The study was titled the "Northeast Water Supply Study" (NEWS) and included all of the Northeast, with a major area being the southeast section of New York and adjacent areas in Connecticut and New Jersey. This study has not yet been completed. However, the Commission reviewed the reports which have been issued.

This interest of the Federal government in local water supply matters is a new and expanded interest. In effect, it puts the states on notice that Washington is getting ready to act if effective state or local action is not forthcoming.

State Interest

The State response to the mid-sixties drought crisis was two-pronged. The first action was a broad reconnaissance study of the entire state in order to define and quantify water supply needs and water resource availability. This was completed in 1967 and formed the foundation for further action. The second action was the program of state assistance (100%) for "Comprehensive Public Water Supply Studies and Reports" to be undertaken by local government pursuant to Article V, Part V-A of the Conservation Law (CPWS). Most counties in the region undertook these CPWS studies, and one such study was done jointly for New York City and Westchester County.

Controversy

The recommendations of the New York-Westchester Study sparked a statewide controversy. This CPWS study recommended the construction of a reservoir at a site on the upper Hudson, within the Adirondack Park, known as Gooley No. 1 located about one mile south of the confluence of the Hudson River and Indian River. The resulting impoundment would flood a natural or wild river valley. The basic purpose of the reservoir was to provide sufficient flow in the lower Hudson at Hyde Park for a water withdrawal of 500 million to 1500 million gallons per day without allowing the salt front to move upriver.

The controversy triggered by this recommendation was a classic confrontation between conservation interests on the one hand and urban interests on the other. The proposal was soundly defeated when conservationists and Adirondack representatives proposed a statute prohibiting forever the use of the Gooley area for reservoir purposes. The Bill passed unanimously in the Legislature. It is of interest to note that the Legislators representing New York City districts voted for the bill. There was strong feeling that alternative sources outside the Park area had not been fully investigated, that present water management practices were defective, that the study had not given sufficient attention to environmental effects, and the whole metropolitan water situation needed additional study. Furthermore, the Temporary Study Commission on the Future of the Adirondacks was at that very time in the process of seeking ways to protect the future of the Adirondacks as the largest wild forest left in the Eastern United States.

Other Issues

Concurrently other water supply and related issues were being raised independently by other CPWS studies; e.g. the whole water supply-wastewater issue, particularly on Long Island, the intercounty transfer of water, the abrasive relationships between New York City and counties outside the city over water system development and management policies and practices. In addition, the federally sponsored NEWS study was underway.

Commission

All of these factors, with Gooley as the catalyst, led to the formation of a selected ad hoc committee of high state officials. This committee recommended that a Temporary State Commission be created and given a broad mandate to review the water supply situation in Metropolitan New York including technical, administrative and environmental aspects, and to make appropriate recommendations.

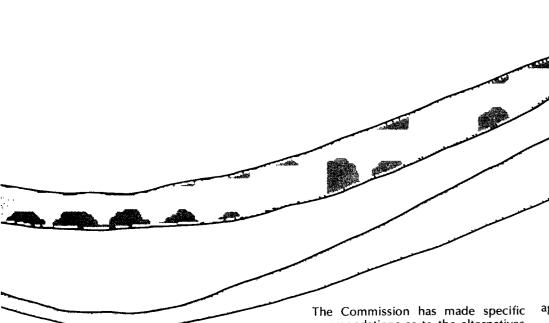
THE COMMISSION Creation

The Temporary State Commission on the Water Supply Needs of Southeastern New York was created by Chapter 593 of the laws of 1969. The governor's approval message outlined the challenge to the Commission:

"The efforts of this Commission will lay a proper foundation for meeting the water supply needs of New York City and the entire southeastern portion of the state for the remainder of the twentieth century."

The Temporary State Commission on the Water Supply Needs of Southeastern New York is a joint legislative-executive Commission consisting of fifteen members; seven members appointed by the Governor, four members by the Temporary President of the Senate, and four members by the Speaker of the Assembly. The Governor designated the Chairman and Vice Chairman.

The Commission was empowered to undertake any studies, inquiries, services or analyses it deemed relevant, through its own personnel or in cooperation with or by agreement with any other public or private agency. It could request and receive from any unit of local government or from any agency of the State, whatever assistance the Commission deemed necessary or desirable for the proper execution of its powers and duties. It was authorized to enter into any agreements and empowered to do any acts that might be necessary to carry out its objectives.



The members of the Commission received no compensation for their services. The Commission was empowered to employ whatever personnel it deemed necessary to perform its function. It could hold public or private hearings and had all the powers to which a legislative committee is entitled.

Mission

The mission of the Commission was to study, analyze and evaluate the water supply needs of Southeastern New York, develop a set of alternatives and make specific recommendations to meet these needs.

The Commission was directed to:

- a. determine the long-range water supply needs of southeastern New York State within a service area including New York City, Nassau County, Suffolk County, Westchester County, Rockland County, Putnam County, Orange County, Ulster County, and Dutchess County.
- b. evaluate the water resources and faservice area.
- c. analyze alternative methods for constructing, financing, and administering needed facilities.
- d. give due consideration to current and previous work on water resource-water supply needs and related matters applicable to the Commission's mission.

The Commission developed specific alternatives to meet water supply needs:

- a. for the development of additional water supply facilities,
- b. for financing and administering the construction, operation, maintenance of facilities, and
- c. for delineation of state and local responsibilities in providing needed water supply facilities and services.

recommendations as to the alternatives developed in light of:

- projected needs,
- b. environmental impact on existing water supplies, other communities, conservation, and natural beauty,
- c. projected costs of the alternatives.

The Commission was directed to make a final report by December 15, 1973 and is to terminate on March 31, 1974.

THE PROGRAM Organization and Program Development

The Commission was activated in late 1970. In 1971 a program design was formulated and a staff was recruited.

The program had three major ele-

- 1) quasi-formal public meetings and conferences.
- 2) technical and management studies and analysis, and
- 3) development of program recommendations.

A series of conferences with local cilities available to meet these officials, state agencies, public interest needs, both within and without the groups and federal and interstate agencies were held. The technical studies got underway, as did the management studies, in 1971.

> During 1972, the program continued as planned, although the emphasis shifted somewhat. In 1971 a major effort was devoted to the conference phase, while in 1972 evaluation, studies and analysis were paramount.

Conferences

Formal Commission conferences were held with state agencies, namely:

Environmental Facilities Corporation Department of Transportation Department of Health Office of Planning Services Department of Commerce

Department of Environmental Conservation **Public Service Commission** Atomic & Space Development Authority

Conferences were also held with local agencies:

County or City Place Suffolk Hauppauge New York City New York City Ulster Kingston Westchester White Plains **Dutchess** Poughkeepsie Rockland Nanuet Putnam Carmel Orange Middletown Nassau Mineola

The conference phase extended through 1972. Additional conferences were held with:

SUNY Atmospheric Science Research Center

Connecticut Interagency Water Resources Planning Board U.S. Environmental Protection Agency New Jersey Department of **Environmental Protection**

U.S. Corps of Engineers concerning the NEWS Study Delaware River Basin Commission Conservationists Joint Venture Engineers, CPWS 27 Delaware River Master

Public Hearings

A series of public hearings were held in July, 1973, at Albany, New Paltz, White Plains, New York City and Mineola.

Staff studies were carried out under two broad categories: 1) technical and 2) management and legal, the former under the direction of Paul W. Merkens and the latter under the direction of Dr. David E Buerle.

These studies culminated in a series of reports of the Commission.

Published background reports of the Commission are:

First Year Report (2/1/72)

Documentation of the origin of the Commission, the plan and program design and the activity during the first year of operation.

ductive in a non-drought period. When drought conditions prevail, weather modification is least productive. This is to be expected, for when drought conditions prevail there is very little moisture in the atmosphere In order to utilize weather modification it would be necessary to get more water before a drought and store it for use during the drought. This makes it necessary to construct additional reservoir volume to store the water for use during the drought.

By requiring weather modification before a drought occurs, there are two levels of uncertainty. The first level is the uncertainty of being able to predict the results of weather modification. The second level is the uncertainty of being able to predict a drought. When the unreliability of weather modification is multiplied by the unreliability of predicting droughts the total reliability of this technology becomes quite small. The uncertainties of weather modification could be reduced through more research.

There are also considerable legal problems associated with weather modification. These legal problems deal with the people in the area to be cloud seeded, as well as the people down-wind from the cloud seeded area. The people down-wind from the cloud seeding area may feel that they are facing diminished rainfall because of the cloud seeding activities up-wind.

Recognizing the great uncertainties of weather modification, coupled with the extreme urgency of public water supply, It is thought that weather modification is not a viable approach to water supply in the region. It is unnecessary to take such a risk in an area as water rich as the southeastern New York region when public water supply is such an essential use of water. Further research is suggested and recommended.

WASTEWATER RECYCLING AND REUSE

28. Given the plentiful supply of high quality water available in this area, direct reuse of treated wastewater for drinking is an unacceptable and unnecessary risk due to the state of the art. Furthermore, it has serious

economic and technical drawbacks. The U.S. Environmental Protection Agency should expand research into advanced wastewater treatment and the needed controls to make direct recycling a safe reliable procedure.

Due to the critical nature of water supply in Nassau County, a recharge project should be developed and implemented providing for the recharge of treated wastewater into the groundwater through recharge basins and shallow wells. This should be a cooperative project carried out by federal, state, regional and county agencies with substantial federal and state funding.

Wastewater recycling and reuse is a process of taking water from a sewage treatment plant, giving it an extremely high degree of treatment to make it potable, and then injecting it back into the water supply system. If the treated water is injected directly into the water distribution system this is called direct reuse. If the water is put back into the system farther back in the hydrologic cycle, this is called indirect reuse. Examples of indirect reuse are groundwater recharge or putting the treated water into a river far upstream from the point where the water is withdrawn for public water supply.

The biggest draw-back to wastewater recycling and direct reuse is the lack of adequate safety factors. Although the technology is currently available, it has not been in effect long enough to prove its reliability on a 100 per cent basis. One hundred per cent reliability is absolutely necessary for public water supply. With direct reuse there is no margin for error between the water source of a sewage treatment plant and water consumers. Should there be a failure in the water treatment process, the results could be disastrous.

In addition, the present treatment processes are inadequate to remove certain types of contaminants contained in sewage water. Certain types of inorganics would not be removed and would continue into the public water system. More important, it is unknown to what degree viruses would be removed from the

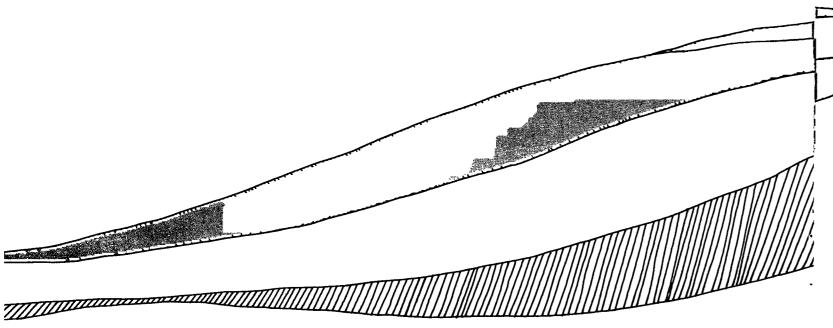
The uncertainty of removing certain inorganics and viruses makes direct reuse

of highly treated wastewater an unacceptable approach to public water supply. It is felt by the Commission that the health risks associated with direct reuse are unwarranted. This is the same conclusion reached by professionals in the water supply field. The American Water Works Association (AWWA) has issued a policy statement which recommended limited reuse but not direct potable reuse because of the lack of scientific knowledge and technology. The Water Supply Division of the Federal Environmental Protection Agency does not support direct interconnection between wastewater reclamation plants and municipal water treatment plants. The overwhelming concern for public health within the water profession makes direct reuse of wastewater an unacceptable approach.

Although direct reuse of treated wastewater is not recommended for the southeastern New York region, it is recommended that further research be undertaken by the Federal Government. This research would be directed towards reducing the health hazards of direct reuse.

In contrast to direct reuse, it was concluded that indirect reuse of treated wastewater is feasible. In fact, indirect reuse is already occurring in many instances in New York State. The use of the Hudson River by the City of Poughkeepsie is an example of indirect reuse. Another example of indirect reuse is on Long Island where the groundwater aquifer serves both as a source of water supply and a discharge point for wastewater from private septic tanks.

Because of the past experience on Long Island, it is thought that indirect reuse is a feasible approach to water supply for Long Island. This is particularly true for Nassau County which is or will soon be experiencing a water supply deficit. By collecting the sewage and giv-ing it a high degree of treatment and then injecting it back into the groundwater aguifer, the water supply situation in Nassau County could be readily eased. By putting the water into the groundwater aquifer there is a significant buffer between the treatment plant and the water user. This buffer gives an adequate delay in time and distance to serve as a



the Commission to determine their applicability to public water supply.

The general conclusion from this study was that desalting, while technically feasible, is not a viable alternative for public water supply in this region. At this point in time and for the anticipated future, the cost of desalting is not competitive with traditional means of water supply. Not only is desalting costly in economic terms, but it has some environmental problems. A by-product of the desalting process would be large amounts of brackish water with concentrated salinities. The proper disposal of the concentrated brine solution would pose environmental difficulties.

A further constraint to desalting is the lack of experience with large desalting plants presently in operation around the world. Existing plants are of rather small scale. They are generally on the order of one to two MGD capacity, and the largest desalting plant presently in operation has a capacity of only seven MGD per day. When it is remembered that the anticipated deficits in the region will amount to about 500 MGD it is seen that the existing prototypes would require a large increase in plant size to meet the magnitude of water needs demanded.

For these reasons desalting was not recommended as a possible source of water for the region. However, it is suggested that further research be undertaken and that a large desalting plant of 50 MGD be constructed by the federal government to gain more experience with large desalting operations.

WEATHER MODIFICATION

27. At the current time the reliability and efficiency of weather modification in this climate is too uncertain to be quantified and to be relied on for additional water in times of need. Controlled field experiments on the feasibility of weather modification in southeastern New York should be carried out jointly by the appropriate

federal and state agencies. The State University Atmospheric Sciences Research Center is the appropriate agency to undertake such a program in cooperation with the Department of Environmental Conservation and federal agencies.

Weather modification is an emerging technology which looks extremely enticing because it promises water at very low costs. The major costs of weather modification are merely the cost of flying an airplane and the chemicals used to seed clouds. If the cloud seeding results in increased precipitation and runoff then the water productivity of existing systems could be increased at very small cost.

There is, however, a great deal of uncertainty connected with weather modification, particularly in the southeastern New York region. There has been some success with weather modification in areas of the country where the processes of precipitation formation are different from those of the southeastern New York region. The climatological processes in the southeastern New York region which create precipitation do not lend themselves to weather modification. Therefore, there is a great deal of uncertainty connected with the productivity of weather modification.

Furthermore, if weather modification were productive, it would only be pro-



Compendium of Water Supply Studies (8/1/72)

A summary and review of water supply studies complete or underway in the southeast region.

Proceedings—

State Agency Conferences (11/1/72)

The minutes of the conferences held by the Commission with interested state agencies.

Proceedings Local Government Conferences (12/1/72)

The minutes of the conferences held by the Commission with local officials.

Second Year Report (3/1/73)

A report on program activity and progress.

Proceedings—

Special Conferences (3/15/73)

The minutes of conferences held by the Commission with federal, interstate, New Jersey and Connecticut agencies, and with public interest groups.

Legal, Operational and Financial Data on Water Supply Systems (12/15/73)

A collection in tabular form of all pertinent data on water supply systems in the service area. Included is information on population, water consumption, water yield, legal basis for organization, water rates, revenues and costs.

Water Law in Southeastern New York (12/15/73)

A complete report on legal aspects of water supply services, federal, state and local.

Public Hearings (12/15/73)

The minutes of the public hearings held in July 1973.

Final Reports

The final report of the Commission is contained in the following five reports and summarized in this report.

Scope of Water Supply Needs (11/1/72)
The quantification of water supply needs by region, subregion and county in the study area, based on population projections, industrial demands, and per capita usage, and the safe yield of existing water supply sys-

Emerging Water Supply Technology (3/1/73)

A study of the feasibility of 1) desalting, 2) weather modification, 3) reuse,

and recharge in meeting water supply needs.

Measures to Reduce Consumption (11/1/73)

A study of the impact on water consumption and use of 1) leakage control, 2) water appliance and fixture design, 3) water pricing, 4) universal metering, and 5) public education and restricted use.

Proposed Water Supply Projects (12/15/73)

An analysis of a number of alternative projects to supply additional water to southeastern New York, along with a final recommendation.

Institutional Arrangements and Alternative Futures (12/15/73)

A study and evaluation of the current institutional arrangements and an analysis of different approaches to develop and administer a comprehensive regional water supply program, along with a final recommendation.

Consultants

Drafts of major reports were submitted to and reviewed by the consultants and their suggestions were taken into account in preparing the final documents.

Executive Meetings

Throughout the life of the Commission a series of Commission Executive Meetings was held to review and pass on staff documents and reports.

APPRECIATION

The Commission and the staff would like to take this opportunity to express their appreciation for the cooperation and assistance provided by local, state and federal agencies and officials, and for all those other people and organizations who participated in and contributed to the work of the Commission.

A special note of appreciation is due to President Edward E. Palmer, President SUNY College of Environmental Science and Forestry for the release of the Executive Director to work for the Commission, and for the many other services provided to the Commission Staff.

CONCLUSION

This study and the final report represents the effort of the Commission to carry out the mission given to it by the enabling legislation. The implementation of these recommendations will insure the provision of adequate water to meet the needs of southeastern New York in an effective, efficient, economical and timely manner, with proper consideration for resource and environmental values and concerns.

PREFACE

This summary final report of the Temporary State Commission on the Water Supply Needs of Southeastern New York is a summary of conferences, hearings and studies distilled into thirty-five recommendations. The recommendations are presented initially as a table of contents with no explanatory text, divided into seven chapters: 1) meeting water needs, 2) measures to reduce consumption; 3) local projects; 4) local institutions: 5) environmental considerations; 6) emerging water supply technology; and 7) federal, state, and interstate roles. This is followed by separate chapters repeating the appropriate recommendations with explanatory text.

The recommendations call for a new regional water agency, the development of additional sources and facilities, universal metering, cooperative assistance and leadership from the federal and state governments, a greatly strengthened county role, prohibition of additional investor-owned works, increased state responsibility for environmental management, an expanded public education program, and expanded research into new technology.

Since this is a summary document, those readers particularly interested in detailed information and analysis are referred to the publications of the Commission listed in the introduction.

CHAPTER 6

EMERGING WATER SUPPLY TECHNOLOGY

TABLE OF CONTENTS

- In order to meet regional water supply deficits projected by the commission, the following are recommended to increase the supply of water:
 - A. 1) Construction of intake works, treatment and pumping facilities for a withdrawal from the Hudson River in the vicinity of Hyde Park and an aqueduct to West Branch Reservoir by 1985. The facility would be operated to furnish 285 million gallons of water per day as a flood skimming project with provision for expansion to a continuous withdrawal operation.
 - 2) Expansion to provide for increased yield to 500 million gallons of water per day by use of additional upstream storage at Hinckley and extension of aqueduct to Kensico Reservoir by 2005.
 - 3) Integrated operation of the new source and facilities with the existing Catskill, Delaware and Croton Systems.
 - B. Provision for adequate transmission capability and capacity to deliver water to the entire service area, particularly to Nassau County by 1985.
 - C. Development of feasible local projects in Orange, Rockland and Suffolk Counties.
 - D. Development of major recharge facilities in Nassau County.

REDUCING WATER CONSUMPTION13

- To assist in meeting regional water supply deficits the following are recommended to reduce water consumptions.
 - A. Universal water metering, particularly in New York City, be instituted and be completed by 1985. This will help to meet the projected needs by reducing water consumption an estimated 240 million gallons per day by 2020.
 - B. Additional conservation measures such as a leakage control program, use of water saving appliances, use of pricing mechanisms, and a long range education program should be undertaken in conjunction with universal metering. Metering is a necessary precondition for the effective development of these programs.
 - C. In order to encourage water conservation measures New York State in cooperation with the Delaware River Basin Commission should petition the U.S. Supreme Court to eliminate the present "excess release" requirement imposed on the City of New York by the Court based on the 1930's drought.

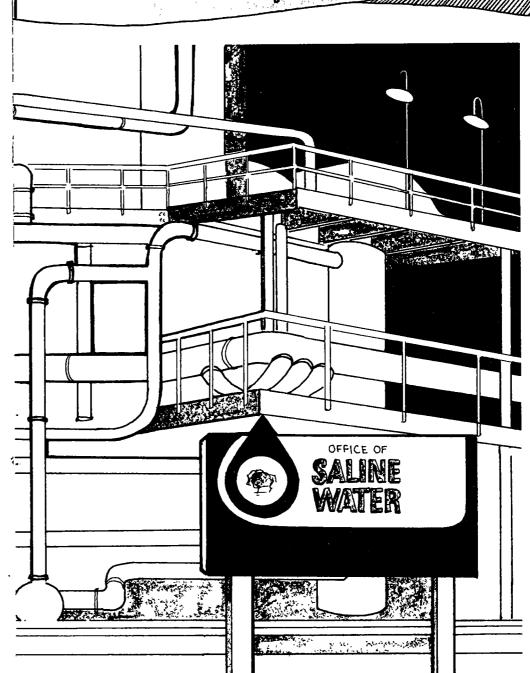
PERSPECTIVE AND APPROACH21

3. In order to implement the proposed program a new institutional arrangement for the region is recommended. The southeast region is faced with the need for a new perspective and approach. Most of the counties and the city have water supply problems that can only be approached in a regional context. Most of the coun-

ties and the city individually lack the capability to cope with the increasing water supply needs, coupled with the environmental complexities. New sources of supply, improved transmission capability, effective use of the water resources, urban water resource integration, environmental responsiveness and regional development are some of the major elements that require a new regional outlook and approach.

RECOMMENDED REGIONAL APPROACH21

- 4. It is recommended that a regional Southeast Water Facilities Corporation be established by special act of the legislature with an effective date of April 1, 1976. The corporation would be a self supporting instrumentality of the state and would plan, develop, construct and operate the recommended water supply facilities for the region. The corporation would take over New York City upstate facilities and operate these facilities in an integrated manner with the recommended projects. This recommended approach would make most effective use of the available water resources and existing water facilities, maximize economies of scale and operational efficiency, best serve the needs of source and service areas, and introduce a high level of environmental responsi-
- 5. It is recommended that an implementing agency be created by the legislature effective April 1, 1974. This agency will provide a transition period of two years from the present arrangements to the new Southeast Water Facilities Corporation. The agency will be charged with the responsibility for effecting



INTRODUCTION

The Commission has also explored alternate ways of meeting the region's deficit through water supply projects which employ emerging technology Emerging technologies were explored to determine if they could be applied to water supply with less cost than traditional designs. The different technologies studied were desalting, weather modification, wastewater reclamation and reuse, and groundwater recharge.

DESALTING

26. Because of high costs, associated environmental impacts, and the lack of experience with large scale desalting operations, desalting is not a viable alternative for public water supply in this region. To gain experience with large scale operations, prototype desalting plant of 50 million gallons per day or more capacity should be constructed. This plant should be totally funded by the federal government because of its experimental nature and of the national interest and implications. Such an experimental plant is essential to properly evaluate the economic, technical and environmental feasibility of large scale desalting operations in the northeastern portion of the United States.

Long Island and New York City are surrounded by the ocean, and it has been thought that desalting might be able to tap the ocean to supply large amounts of fresh water. By taking saline water from the ocean or the Hudson estuary, and removing the salt, it was thought that vast amounts of fresh water could be made available nearest the areas of most intense water supply needs. Therefore, desalting through distillation, electrodialysis, reverse osmosis and freezing were thoroughly studied by the staff of

Protecting the Water Resources

Rapid population growth on Long Island has resulted in significant increases in septic tank effluents to the groundwater aquifers of the Island.

This resulted in pollution of the aquifers for which Long Island is dependent for all of its water. As the upper aquifers have become polluted, water supply wells have been drilled into deeper and deeper water layers.

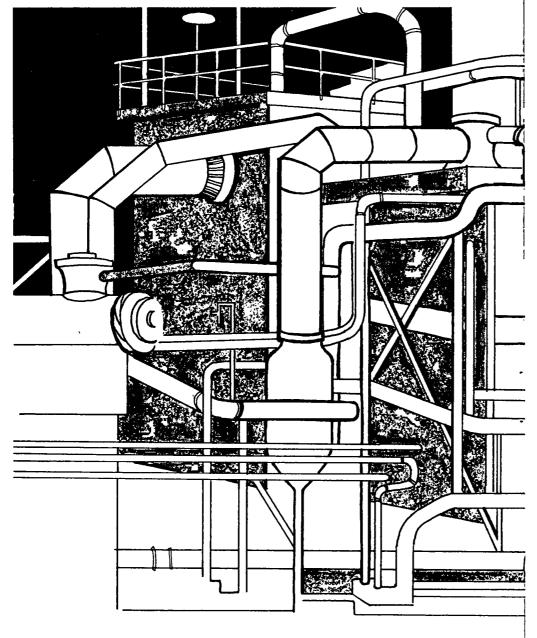
The problem has been most pronounced in western Nassau County and adjoining Queens, area of densest population. Water being pumped in Queens by the Woodhaven Division of Utilities and Industries Corporation is of such poor quality that the company was recently forced to enter into an agreement whereby New York City has agreed to take it over.

To abate pollution of the aquifers a program has been initiated to serve large areas of Nassau and Suffolk County and to discharge the treated sewerage to the ocean. While this will keep pollutants from the aquifer, it will also keep water from the aquifer. The large amounts of water reentering the aquifer from septic tanks will be lost to the ocean. This will result in a net loss of water and lower the groundwater table.

To avoid poor water quality and reduced water quantity facilities must be developed to treat the wastewater and rechange it back to the groundwater. This will reduce pollution as well as conserve water. Because of the advanced technology required by this approach, federal and state involvement is warranted.

THE HUDSON RIVER

The Hudson has been exposed to increasing amounts of pollution from municipal and industrial effluents. However, state efforts to reduce that pollution through a water pollution control program have met with considerable success. As a result the Hudson is cleaner today that it was a decade ago. It will continue to improve as additional treatment facilities are brought on line.



a smooth and orderly transition to enable the corporation to become operational in a short period of time.

 Every consumer from a major community water system in the southeast region should be metered. Such

CONSUMER METERING29

action will reduce water consumption an estimated 240 million gallons per day, mostly from the New York City system by the year 2020 and provide system operators with an essential management tool in controlling leakage and unaccounted-for water, and in establishing fair and equitable rate schedules. Appropriate legislation should be enacted at the state level to require metering of the remaining un-

 Universal consumer metering should be initiated in New York City. This course of action has been recommended for the last century and is fully justified to improve efficiency, reduce water consumption, reduce wastage and to raise management effectiveness.

metered services.

A detailed plan and implementation program should be developed to meter the remaining unmetered services by 1985. This should be mandated by state legislation.

LEAKAGE CONTROL.....31

8. A regular leakage control program should be established for all community water supply systems. Surveys and field investigations on a regular basis are essential, as opposed to a breakdown program which is based

on main breaks, pressure drops, localized flooding or pavement collapse. This would also put leakage control on a systematic basis and eliminate speculative assessments.

A necessary precondition for an effective leakage control program is universal metering. This pinpoints areas of changing water demands, allows detailed system analysis, locates leaks, and provides a continuous record and audit of the water furnished and consumed in the distribution system.

WATER SAVING APPLIANCES ...32

9. The use of water saving toilets, shower heads and appliances should be encouraged. Over an extended period of time up to 15 gallons per capita per day could be saved. Requirements for water saving appliances should be incorporated into building codes to cover new and renovated buildings.

WATER PRICING33

10. Water pricing to possibly influence consumer consumption should be investigated for possible use in the region by water purveyors. It is recognized that water is not a free market good as pricing policy is constrained by regulatory requirements. However, to the extent that discretion is allowed, pricing mechanisms (through the use of penalties for excessive consumption as an example) may be of value in reducing demand. Universal metering is a necessary precondition for use of pricing mechanisms.

PUBLIC EDUCATION34

11. A long range public education campaign should be undertaken by the schools, municipalities and water supply institutions, relative to the importance of water and the need to use it wisely. It should be part of the current development of programs related to environmental management and conservation.

In times of crisis, such as occurred in the 1960's, a crash campaign coupled with symbolic and substantive water use restrictions was undertaken. Such efforts, while outstanding successes, cannot be sustained for a long period of time or in times of water plenty.

As with other conservation efforts, universal metering is a necessary precondition if any long term educational program is to be creadible and effective.

CHAPTER 3 LOCAL PROJECTS35

NASSAU COUNTY35

12. A project to furnish additional water for Nassau County must be developed as soon as possible to meet a critical water deficit. A groundwater recharge project using renovated wastewater in an amount up to 70 million gallons per day should be undertaken immediately. (See also recommendation 29)

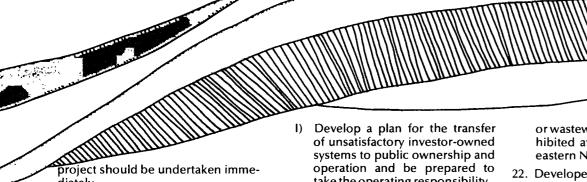
The regional corporation should provide for the importation of upstate surface water by 1985 through project development.

ROCKLAND, ORANGE, AND SUFFOLK COUNTIES35

 Proposed local projects should be implemented as need dictates providing they are acceptable locally.

NEW YORK CITY AND ULSTER, DUTCHESS, PUTNAM, AND WESTCHESTER COUNTIES35

14. In order to meet the water needs of these areas, the proposed regional



CHAPTER 4 LOCAL INSTITUTIONS39

GENERAL39

15. Meeting the water supply needs of southeastern New York call for consolidating services and facilities on the city, town and village levels; providing for the meeting of development needs; phasing out of unsatisfactory developer type systems; integrating the planning and operation of all urban water services; greatly strengthening the county role in water supply and urban water ser-

COUNTIES40

meet future needs.

vices; and establishing a new re-

gional configuration and format to

- 16. Each county should establish and maintain a strong county water, sewer and drainage agency. This agency should:
 - A) Develop a county water supply plan and update biennually
 - B) Create county wide or part county water districts as needed.
 - C) Manage and operate any water supply facilities constructed by the county
 - D) Insure that future water supply developments conform with the county plan
 - E) Provide technical services to local town, village and city sys-
 - F) Manage and operate water supply facilities at the request of local government units
 - G) Act as the liaison between a regional supplier and all systems within the county. The county should be the sole buyer of water from the regional supplier for resale to local systems
 - H) Act as liaison to any regional established

- take the operating responsibility
- J) Integrate water supply facilities, sewage collection facilities and urban drainage facilities into a complementary and mutually supportive system on a county wide basis

NEW YORK CITY41

- 17. It is recommended that New York City become part of a new regional configuration so that its water supply needs can be met in a timely and equitable manner. (See recommendations 1 thru 5)
- The city should immediately reexamine the present policy and operating procedures relating to the timing and volume of releases from its reservoirs in order to maintain reasonable environmental conditions consistent with water supply needs and local concerns. (See recommendation number 24)

CITIES, TOWNS AND VILLAGES42

- 19. In order to take advantage of economies of scale, to improve service and to equalize water cost to consumers, all local governments should consider the consolidation of water supply and related services. Each town should consider the consolidation of existing and future districts into a single district or abolishing all districts and making water supply services a general town function.
- Since water supply and wastewater disposal services are opposite sides of the same coin, the integrated development and operation of such services should be investigated by all local governments and implemented where feasible.

INVESTOR-OWNED45

water resources board or agency 21. The further formation of private investor-owned water supply utilities

- or wastewater utilities should be prohibited after June 1, 1975, in southeastern New York.
- 22. Developers should be required to construct water supply, sewage, and drainage systems at their expense but the appropriate municipality should assume ownership and operational control of such facilities. All such systems should be in conformance with a town-wide and county-wide plan. Local governments should require the formal establishment of water, sewer and drainage districts or assessment areas for all new developments. Unsatisfactory and inadequate investorowned water and sewer systems should be taken over by the appropriate municipality.
- 23. Regulatory efforts should be intensified to insure adequate service from small developer type water and sewer systems. The state should require that all community water supply systems be sized to provide a fire protection capability.

CHAPTER 5 **ENVIRONMENTAL** CONSIDERATIONS 47

24. The New York State Department of fish and wildlife and other values.

and adversely affected recreation opportunities. Many witnesses before this Commission have attested to this problem and suggested modified regulation of the downstream releases to abate adverse environmental impacts. The Commission has endorsed their suggestions and recommend that the State Department of Environmental Conservation regulate the downstream releases.

EXPECTED IMPACT OF **ENVIRONMENTAL IMPACT PROPOSED FACILITIES** 24. The New York State Department of

INTRODUCTION

Since its inception, the Southeast

Water Supply Commission has been con-

cerned with the environmental con-

siderations of public water supply. This

concern has focused on the impacts of

existing facilities, minimizing the impacts

of additional water needs, and designing

water supply plans to keep environmen-

Environmental Conservation should

be given the authority and respon-

sibility by the State Legislature to

establish the quality, timing and vol-

ume of releases below all water sup-

ply impoundments in the source and

service areas of southeastern New

York. This will make it possible to

protect the public interest in main-

taining viable streams below im-

poundments and preserve aesthetic,

opment, water takings and waste

water disposal projects must be eval-

uated as to environmental impact

and developed and operated so as to

minimize any adverse environmen-

tal effects. Such requirements

should be structured into the regu-

latory programs of the Department

of Health and Conservation.

IMPACT OF EXISTING FACILITIES

The most serious environmental ef-

fects of the existing reservoir system re-

sult from the operating procedures of

the New York City reservoir system. In

response to changing conditions of

streamflows, water supply demands, and

fish and wildlife and other values.

25. All water supply source devel-

tal impacts within acceptable limits.

The Hudson River Withdrawal Plant

A major water resource in the region is the Hudson River. At present the river is not directly used as a southeastern New York water supply (although some tributaries have been impounded for New York City water use). It should be noted that Poughkeepsie derives its water from the Hudson.

The withdrawal plant proposed for Hyde Park would be located in 70 acres of undeveloped land. Its operation would be restricted to the six month period of highest flow until such time as augmentation of Hudson River flow

At this time it is premature to speculate on the exact impact of this facility on the River's flow and on the marine population which it supports. However, a preliminary report done for this Commission by the Boyce Thompson Institute for Plant Research, Inc. strongly suggests that the River's regime would not be significantly changed. The report, entitled A Preliminary Environmental Impact Statement Relative to Flood Skimming of the Hudson River, indicates that if the salinity regime is not significantly altered, particularly if the salinity levels downstream requirements, intermittent found at Croton Point do not shift northreleases are made from the reservoirs. ward, no significant changes will occur These releases are often quite variable in the carrying capacity of the river as through time, temperature, and quan-regards biological activity. Since the with-

main below Poughkeepsie, it is likely that the salinity regime would remain basically unchanged.

Hinckley Reservoir Expansion

CHAPTER 5

ENVIRONMENTAL

CONSIDERATIONS

Flow augmentation of the Hudson to add up to 500 MGD via expansion of Hinckley Reservoir would flood about 10,000 acres and would raise the water level about 50 feet. The principal environmental effect would be displacement of properties and wildlife. The Reservoir is located in a sparsely populated area, so displacement would be minimal, despite the contemplated areal extent of the expansion.

A field survey was conducted to ascertain the number of people that would be displaced. The results of the survey are shown in Table 13. The animal wildlife displaced could be accommodated in the adjacent areas.

TABLE 13 **EXPECTED DISPLACEMENTS DUE TO PROPOSED** HINCKLEY RESERVOIR **EXPANSION**

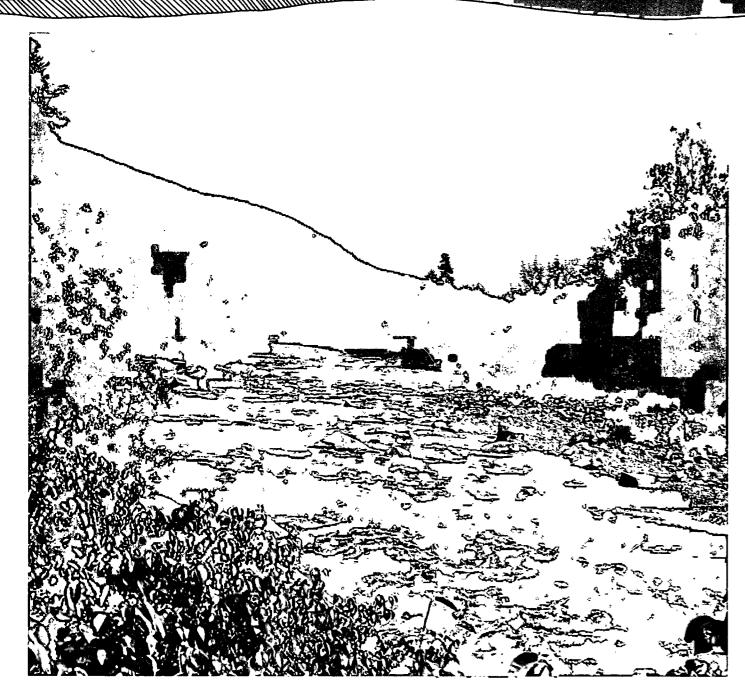
Number
192
314
161
667
16
3
686

Reregulation of Sacandaga Reservoir

A possible alternative to augment the flow of the Hudson would be the reregulation of Sacandaga Reservoir. Such a procedure would lower water levels in the summer, and reduce recreational optity. The extreme variations have inhib- drawal plant would be operated in such portunities on the reservoir. However, ited the downstream fish populations a manner that the salt front would re- no displacements would be necessary.

ENVIRONMENTAL IMPACT47

- **Environmental Conservation should** be given the authority and responsibility by the state legislature to establish the quality, timing and volume of releases below all water supply impoundments in the source and service areas of southeastern New York. This will make it possible to protect the public interest in maintaining viable streams below impoundments and preserve aesthetic,
- All water supply source development, water takings and waste water disposal projects must be evaluated as to environmental impact and developed and operated so as to minimize any adverse environmental effects. Such requirements



should be structured into the water supply regulatory programs of the Departments of Health and Environmental Conservation.

CHAPTER 6 **EMERGING WATER SUPPLY** TECHNOLOGY49

DESALTING49

26. Because of high costs, associated environmental impacts, and the lack of experience with large-scale desalting operations, desalting is not a viable alternative for public water supply in this region. To gain experience with large-scale operations a prototype desalting plant of 50 million gallons per day or more capacity should be constructed. This plant should be totally funded by the federal government because of its experimental nature and of the national interest and implications. Such an experimental plant is essential to properly evaluate the economic, technical and environmental feasibility of large scale desalting operations in the northeastern portion of the United States.

WEATHER MODIFICATION50

27. At the current time the reliability and efficiency of weather modification in this climate to too uncertain to be quantified and to be relied on for additional water in times of need. Controlled field experiments on the feasibility of weather modification in southeastern New York should be carried out jointly by the appropriate federal and state agencies. The State University Atmospheric Sciences Research Center is the appropriate agency to undertake such a program in cooperation with the Department of Environmental Conservation and federal agencies.

DIRECT WASTEWATER RECYCLING AND REUSE51

28. Given the plentiful supply of high quality water available in this area, direct reuse of treated wastewater for drinking is an unacceptable and unnecessary risk due to the state of the art. Furthermore, it has serious economic and technical drawbacks. 33. In order to encourage conservation The U.S. Environmental Protection Agency should expand research into advanced wastewater treatment and the needed controls to make direct recycling a safe reliable procedure.

INDIRECT REUSE—RECHARGE ..51

29. Due to the critical nature of water supply in Nassau County, a recharge project should be developed and implemented providing for the recharge of treated wastewater into the groundwater through recharge basins and shallow wells. This should be a cooperative project carried out by federal, state, regional and county agencies.

CHAPTER 7 PUBLIC POLICY— FEDERAL, STATE AND INTERSTATE ROLES53

FEDERAL, INTERSTATE AND STATE54

- 30. All federal water resource programming in New York State should be carried out in close cooperation and as joint endeavors with the appropriate agencies of the State of New York.
- The cooperative U.S.G.S.—State data collection and analysis programs should be continued and expanded where necessary. An expansion of the program is indicated for the Hudson River Basin and Long Island.
- 32. The final recommendations of the Federal Northeastern Water Supply Study (NEWS) should be closely coordinated and integrated with any state or regional planning proposals in order to make best use of the financial capabilities and water resources available to meet the water supply needs in the southeastern region.

- measures and universal metering in the southeast New York region, New York State should immediately commence action in cooperation with the Delaware River Basin Commission to eliminate the "excess release" requirements imposed on the City of New York.
- The current application of The Department of Environmental Conservation to the Water Resources Council for financial assistance to develop a water resources management plan for the Hudson River Basin and Long Island is endorsed and supported.
- 35. Federal, interstate and state government roles in water supply should be restricted to research, data collection, planning, regulatory and financial assistance functions. All water supply services facilities design, construction, and operation should remain at the regional and local levels.



water needs will or already have transcended individual municipal boundaries.

Consolidation of water supply services would ease these restraints, as well as tend to equalize water costs among different consumers.

It also would facilitate the integration of water supply services with another essentially intermunicipal or regional function, wastewater disposal services. As pointed out, water supply services and wastewater disposal services are opposite sides of the same coin. To date, however, policy in these areas lags behind this reality.

INVESTOR-OWNED SYSTEMS

- 21. The further formation of private investor-owned water supply utilities or wastewater utilities should be prohibited after June 1, 1975, in southeastern New York.
- 22. Developers should be required to construct water supply, sewage, and drainage systems at their expense but the appropriate municipality should assume ownership and operational control of such facilities. All such systems should be in conformance with a town-wide and county-wide plan. Local governments should require the formal establishment of water, sewer and drainage districts or assessment areas for all new developments. Unsatisfactory and inadequate investorowned water and sewer systems should be taken over by the appropriate municipality.
- 23. Regulatory efforts should be intensified to insure adequate service from small developer type water and sewer systems. The state should require that all water supply systems be sized to provide a fire protection capability.

Investor-owned systems are a static enterprise in southeastern New York. Some

of the largest of these systems are facing difficulties with both quantity and quality of water. The smaller systems—particularly those which have proliferated with housing developments in advance of public water facilities—offer marginal service at best.

There are 280 community investorowned companies in the region. Of these 243 serve less than 1,000 people each. Collectively, these 243 account for four per cent of the population served by investor-owned systems. The remaining 37 are major community companies, each of which serves more than 1,000 people. Together they serve 94 per cent of investor-owned system customers.

As with municipal systems, there is a wide range of water production costs and revenues, as well as customer costs. See Tables 9, 10, and 11. However, costs tend to be lower in the larger systems. These systems generally are closer to the urban core, particularly in New York City itself, and in Nassau, Westchester and Rockland counties.

A cost seldom faced by municipal systems, certainly those in which facilities are included within their own boundaries, is taxes. In the eight largest investor-owned systems, on the other hand, taxes range from 23 to 48 per cent of the cost of producing water

Unlike municipal systems, the rates and services of investor-owned systems are regulated by the New York State Public Service Commission. Operating revenue is realized from the rates charged for water and related services. According to law, the companies are entitled to a fair return on investment after providing for operation and maintenance, debt service, depreciation, adequate reserves and real property taxes.

However, for a number of years, the rates and service levels of small companies valued at under \$30,000 were not subject to regulation by the PSC. As a result of complaints over rates and service, all companies, regardless of value,

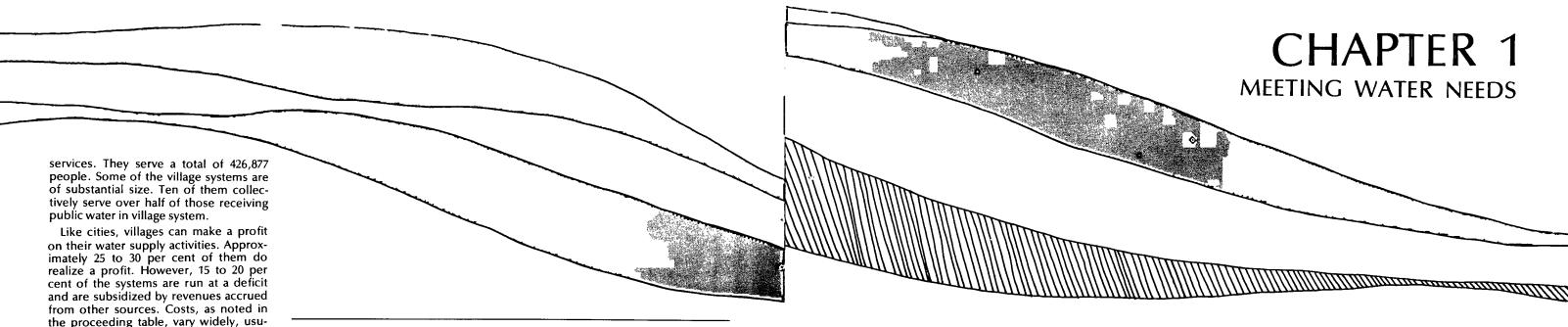
have now been placed under PSC supervision.

Still, this has not quelled complaints about small community water systems, which are primarily developer systems. Practically the only new investor-owned water systems formed in the last 30 years in the southeast region have been developer systems, with an average service population of about 300 in subdivisions of 80 to 100 dwellings. Some 243 of these systems have developed in the Region's fringe areas, especially in Suffolk, Dutchess, Putnam and Orange counties, in advance of public water facilities and with little planning vis-à-vis the larger area.

Regulation of the services of this myriad of small systems is poor, and most of the small systems lack fire capacity. Service is undependable and water pressure frequently low. Local officials allege excessive costs, and in any case cost data of these water systems is poorly kept and almost impossible to obtain.

Many of the larger investor-owned systems also face difficulties. The largest systems are located in urban or suburban areas where there is no room for expansion. Additional sources of water are seldom available to them. Some, most notably the Woodhaven Division of Utilities and Industries Corporation and the Jamacia Water Supply Company, which are located in New York City, are encountering the problem of deteriorating water quality. These two companies rely on increasingly polluted underground sources in Queens County. The Woodhaven situation has become so acute that New York City in 1973 agreed to take over the system and to supply its customers with City water.

Plagued with so many problems, and under pressure to solve them, it is reasonable to assume that many investorowned systems will be phased out in coming years. Certainly, the small developer systems lack the resources to cope with present, let alone future, needs.



ally in direct relation to the age of the TABLE 10 system; the older the system, the lower WATER COSTS PER MILLION GALLONS (IN DOLLARS) In this setting of diversity, it is difficult

	Low	High	Mean ²
Towns	178	3,685	667
Cities¹	213	686	_
Villages	99	1,184	405
Major Investor Owned	207	2,441	507

'Excludes New York City ²Mean—Average Value

the cost.

to generalize about local water supply.

What does emerge is that water costs

and costs to the consumer do not neces-

sarily vary greatly from one type of sys-

tem to another But they do vary con-

siderably from individual system to

individual system, particularly within the

category of town systems. A major vari-

able appears to be age, with the older the

system, whether it be a town, city or vil-

lage system, the lower the costs. This is a

result of the fact that capital debts have

already been retired in the old systems.

The newer systems also have been ex-

posed to the inflation spiral. Con-

sequently, costs tend to be highest in

more recently populated areas farthest

from the central city (New York City). Size

of system may be an important factor in

costs as well, with larger systems

Perhaps the most important general-

ization that can be made about each of

these systems is that most of the munici-

palities have neither the opportunity nor

the resources to expand to meet future

need. Nor do they individually have a perspective that will permit solutions to

problems common to several municipal-

Many, particularly village systems, are

bounded by other urban areas and have

no practical chance to expand. Many,

particularly town systems, are too small

to gain any economies of scale In some

areas, such as Nassau, there is a need to

transmit water from service areas of sur-

plus to service areas of need, and to

blend water from different areas for

water quality control purposes. In urban-

izing counties such as Ulster and Dutch-

ess, many water systems, especially pri-

vately developed systems are small and

often ill-managed. And in most cases,

ities within any given county.

benefiting from economies of scale.

TABLE 11 WATER REVENUES PER MILLION GALLONS (IN DOLLARS) 1972

	Low	High	Mean ²
Towns	143	4,081	656
Cities¹	199	550	-
Villages	129	1,061	427
Major Investor Owned	220	2,554	581

'Excludes New York City ²Mean—Average Value

TABLE 12

VILLAGE WATER SYSTEMS—POPULATION SERVED					
POPULATION RANGES	NUMBER OF SYSTEMS*	POPULATION SERVED			
>10,000	10	234,900			
5,000 to 10,000	20	129,889			
1,000 to 4,999	25	59,533			
<1,000	<u>4</u>	2,455			
Total	61	426,877			

*Discrepancy in number of systems is due to the fact that populations for two village systems are included elsewhere.

INCREASING THE WATER SUPPLY

1. In order to meet regional water supply deficits projected by the Commission, the following are recommended to increase the supply of water:

A. 1) Construction of intake works, treatment and pumping facilities for a withdrawal from the Hudson River in the vicinity of Hyde Park and an aqueduct to West Branch Reservoir by 1985. The facility would be operated to furnish 285 million gallons of water per day as a flood skimming project with provision for expansion to a continuous withdrawal operation.

2) Expansion to provide for increased yield to 500 million gallons of water per day by use of additional upstream storage at Hinckley or reregulation of Sacandaga Reservoir and extension of the aqueduct to Kensico Reservoir by 2005.

3) Integrated operation of the new source and facilities with the existing Catskill, Delaware and Croton systems.

B. Provision for adequate transmission capability and capacity to deliver water to the entire service area, particularly to Nassau County by 1985.

C. Development of feasible local projects in Orange, Rockland and Suffolk Counties.

D. Development of major recharge facilities in Nassau County.

REDUCING WATER CONSUMPTION

2. To assist in meeting regional water supply deficits the following are recommended to reduce water consumption:

A. Universal water metering, particularly in New York City, be instituted and be completed by 1985. This will help to meet the projected needs by reducing water consumption an estimated 240 million gallons per day by

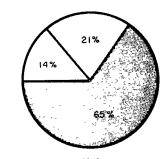
B. Additional conservation measures such as a leakage control program, use of water saving appliances, use of pricing mechanisms, and a long range educational program should be undertaken in conjunction with universal metering. Metering is a necessary precondition for the effective development of these programs.

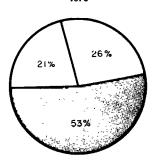
C. In order to encourage water conservation measures, New York State in cooperation with the Delaware River Basin Commission should petition the U.S. Supreme Court to eliminate the present "excess release" requirements, imposed on the City of New York by the court decision based on the 1930's drought.

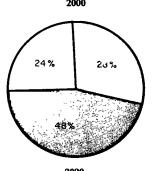
DEFINITION OF NEEDS

The population of the southeastern New York region has grown from 8 million people to 12 million people since 1930. More than half of this increase was concentrated on Long Island. New York City grew by approximately one million people from 1930 to 1950. Since that time, however, the population in the City has more or less stabilized. Past population growth in the Mid-Hudson subregion has been moderate but consistent for the last four decades.

It is anticipated that the region's population will continue to grow, although at a slower rate and in different locations. The population of the region will grow from 12 million people in 1970 to 17 mil-







NEW YORK CITY NASSAU-SUFFOLK MID-HUDSON

FIGURE 1 POPULATION DISTRIBUTION SOUTHEASTERN NEW YORK

lion people by 2020 based on median projections.

New York City will continue to have a of 300,000 or less in the next fifty years. Long Island will have considerable growth and will almost double its population by the end of the planning horizon. Most of the anticipated growth will This subregion will grow by 2.3 million people over the next fifty years. These growth patterns will result in a situation where New York City will eventually have less than 50 per cent of the population of the Region.

The anticipated water needs in the Region will grow even faster than population. In 1970 the public water supply systems in the region supplied almost two billion gallons per day. In the future as population increases, the population density becomes greater, and personal affluence continues to expand, greater amounts of water will be demanded from public water supply systems. By 2000 public water supply systems will have to supply about 2.5 billion gallons per day. In 2020 the level will reach almost 3 billion gallons per day.

The existing water supply facilities are capable of supplying 2150 million gallons per day. Thus, there will be an anticipated public water supply deficit of 850 million gallons per day by 2020. This will have to be met through a combination of new regional water projects, local projects, and conservation measures such as consumer metering. The former is developed in detail in this chapter, the latter two, conservation measures and local projects are mentioned here but more fully developed in Chapters II and III.

Effective management of the existing resource is the most economical means of reducing the anticipated water supply deficit. To this end the Commission has thoroughly explored metering of all water consumers, particularly those in tem or 2) having any county in the region

New York City. As explained in Chapter II, it is estimated that universal metering would reduce consumption in New York City by 15 per cent. By 2020 this would stable population with a small increase result in savings of 240 million gallons per day. The impact of other conservation measures is not readily quantifiable. They are dependent to a great extent on universal metering as a precondition. On a long-run basis, they occur in the Mid-Hudson subregion. would probably have considerable impact. Periodic evaluation is necessary to measure such impact. The proposed program can then be adjusted as experience indicates.

The recommendation to eliminate the "excess release" requirement of the Delaware supply is vital to meeting conservation goals. This is detailed in Chap-

There are only limited possibilities for developing water supplies within the water and financial resources of the local counties. This local potential, if fully developed, could make available 135 million gallons per day for local consumption.

After accounting for the existing level of development, the possible savings from universal metering in New York City, and the contribution from local projects, there will remain an anticipated deficit in the region of 500 million gallons per day by 2020.

THE REGIONAL DESIGN

To supply the regional water supply deficit the Commission has recommended the expansion of the existing New York City water supply system. That is, the existing system will be used as the regional base and water supply projects of regional significance will be added to

This approach precludes 1) any large regional project which would operate independently of the existing regional sys-

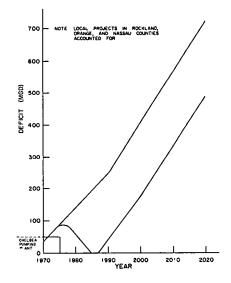


FIGURE 2 WATER SUPPLY DEVELOPMENT PLAN (Assumes middle population projections)

import water on its own. All water supply needs over and above the capabilities of local in-county supply and over and above the capabilities of the existing regional system will be supplied by projects to be integrated with the existing regional system. This is the most efficient approach to regional water sup-

It would be most inefficient, and in some instances absolutely impossible, for each of the counties to act independently and develop its own outside sources. There would be a duplication of effort, competition for the same resources, and problems of regulation and the allocation of water. It would not be possible to realize the economies of scale inherent in a large regional system.

New York City itself will require additional projects to meet its needs. The additional projects would, of course, be in-

TABLE 7 MUNICIPALITIES PROVIDING WATER SUPPLY SERVICES

	Number In Southeastern New York	Number Providing Water Supply Services	Total Number of Systems
Towns	103	59	123
Cities	14	12	12
Villages	159	61	61
Total	277	133	196

TABLE 8 **POPULATION SERVED TOWN DISTRICTS**

POPULATION RANGES	NUMBER OF SYSTEMS*	POPULATION SERVED
>10,000	31	858,440
5,000 to 10,000	11	66,779
1,000 to 4,999	32	79,370
<1,000	21	8,012
Total	95	1,012,601

^{*}Information for 28 towns not separable from parent system, probably most serve under 1,000 people.

TABLE 9 COST TO THE CONSUMER' (IN DOLLARS) 1972

	Low	High	Mean
Towns	22	345	54
Cities ²	33	88	_
Villages	22	200	53
Major Investor Owned	23	128	83
•			

Costs based on water usage of 100,000 gallons ²Excludes New York City

trict the overall number of separate town water supply systems exceeds the number of towns. There are 100 special town districts, 21 commissioner type districts, and two town wide systems. Over one million people are served by the 123 town districts. The 31 largest districts serving over 10,000 people each, provide water to approximately 85 per cent of those in town districts receiving public

Costs of producing water revenues from water sales and costs to the consumer vary widely from one district to another. For a comparison with city, village and major investor owned systems the ranges are shown in the following

Because water revenues in town districts must be used only for water supply purposes in the same districts, no waterderived funds may be diverted for other purposes. In effect, costs and revenues must equal each other. This legal provision acts as an indirect regulatory mechanism, and as a result water supply is essentially a public service in town dis-

No such constraint applies in cities and villages, where water supply is often considered to be a revenue raising device. Water supply funds may subsidize other municipal purposes, or other revenue may subsidize water supply services. No regulation of rates or services offered by these municipal water supply systems exist.

Cities

There are fourteen cities in southeastern New York, excluding New York City. Twelve of those fourteen have municipal water supply systems. The other two are served by investor-owned sys-

Water costs are fairly uniform from city to city. Costs of water provided by cities is generally low, a result of the fact that capital expenditures were made years ago and the debt since retired. Cities are also in the enviable position of generally having larger fiscal bases from which to replace or extend facilities.

Though there are no state or county laws which restrict the accumulation of surpluses, half of the cities actually operate their water supply systems at a deficit.

Villages

Sixty-one of the 159 villages in southeastern New York provide water supply

³Mean—Average Value

transmission mains in their areas has been acrimonious.

The conflict is reflected in water rate disputes. Under the Water Supply Act of 1905 the City must furnish upstate customers water at the aqueducts or reservoirs for the cost to the City at the point of delivery. The City in 1967 tried to raise the rates to \$80 per million gallons for Croton water and \$120 for Catskill-Delaware water. Upstate communities refused to pay, and the matter was brought before the State Department of Environmental Conservation. A decision in early 1973 set the rate for Croton water at \$76.87 per million gallons and the Catskill-Delaware rate at \$103.72.

A per capita limitation also works to the disadvantage of upstate communities. This limit equals the per capita usage in New York City, multiplied by a municipality's population in the last census. The City applies this per capita limit to individual municipalities with small population bases in each upstate county. (Orange, Putnam, Ulster and Westchester) rather than to the county as a whole. Thus, a community with a relatively small population, but, say an industrial plant that uses a large amount of water exceeds the per capita usage the City is required to supply. It has been agreed that this limitation restricts economic development in the upstate communities. The City attempts to impose a retail rate which is ten times the normal wholesale rate on any excess water usage. Normally, the upstate communities refuse to pay.

Similarly, as the section on counties noted, New York City has steadfastly refused to sell water to those counties in which its facilities are located. It interprets the law's terminology of "municipalities" to include cities, villages and towns only. Since a good portion of the water resources in those counties have the development of new outside sources been pre-empted by New York City, to meet future demand, both within and

vented from developing or selling water, thereby restricting their roles to planning and regulation.

New York City's use and operation of its upstate reservoirs have also given rise to criticism, both at and below the reser-

At present New York City limits recreational use of its upstate reservoirs to fishing from the shoreline or from flat bottomed rowboats by permit only. Increasing pressure is being exerted to expand recreational opportunities by allowing hunting on reservoir property, more extensive general recreational use of City land, and water contact activities on the reservoirs.

Perhaps more important have been the criticisms of the City's releases proce-

In both the Catskill and Croton reservoir systems there are presently no downstream release requirements. The City, therefore, releases no water whatsoever from these reservoirs during summer months frequently causing the streams to be completely dried up downstream from impoundments in these systems. In the Delaware besides the "excess releases" the City is also required (by Supreme Court decree) to make "conservation releases" during a 120-day period beginning on June 15. These latter are meant to maintain the one-day low flow of record. In addition, it must maintain a minimum flow of 1,750 cfs at Montague, New Jersey. In practice, streamflows below the reservoirs are uneven, with levels and water temperature fluctuating significantly. These variations hurt fish populations and otherwise hinder the development of recreational opportunities.

These kinds of friction are occurring, and increasing, at a time when New York City must face needs of its own. Situations requiring City attention include

high consumptions within the City. As City watershed areas come under urban growth pressure, particularly in the Croton Watershed, the City must act to combat deteriorating water quality. It must reconstruct and rehabilitate a portion of its facilities, and maintain and repair the City distribution system to minimize leak-

The political and financial pressures that are bound to accompany these exigencies point to the need to cooperate with the rest of the region, as well as vice

CITIES, TOWNS AND VILLAGES

- 19. In order to take advantage of economies of scale, to improve service and to equalize water cost to consumers, all local governments should consider the consolidation of water supply and related services. Each town should consider the consolidation of existing and future districts into a single district or abolishing all districts and making water supply services a general town function.
- 20. Since water supply and wastewater disposal services are opposite sides of the same coin, the integrated development and operation of such services should be investigated by all local governments and implemented where feasible.

Water supply services have been the province of local governments. One hundred thirty-three of the 277 cities, towns and villages in southeastern New York have assumed the responsibility for water supply. Altogether, there are 196 municipal systems (excluding New York City). A number of towns operate more than one water district.

There are 103 towns in southeastern New York. Only 59 of these provide water supply services. Since towns often the upstate counties have been pre- outside the City, and metering to reduce contain more than one water supply dis-

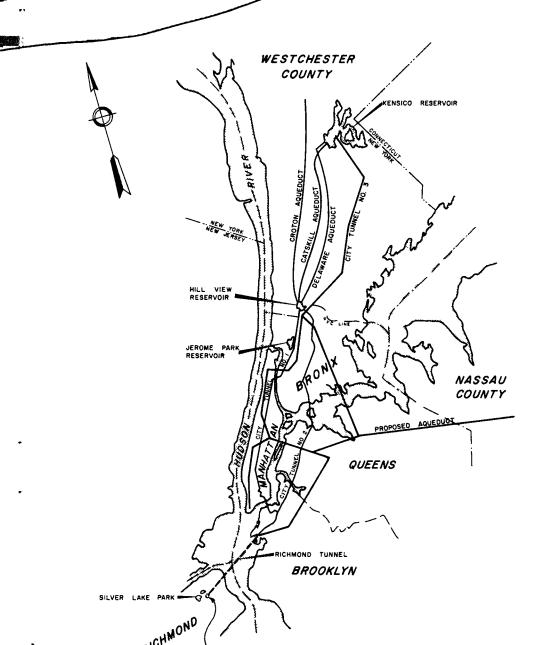


FIGURE 3 NEW YORK CITY TUNNEL SYSTEM AND PROPOSED AQUEDUCT TO

tegrated into the city's existing facilities. If the additional projects are made large enough to include regional needs, the existing storage and transmission facilities with some augmentation can be used to distribute water through the region. This integrated approach will avoid redundancy in facilities.

The New York City system is already a regional system, as the City presently sells water to municipalities in Ulster, Orange, Putnam, and Westchester Counties. This existing regionalization could easily be expanded to supply more of the region.

By integrating new projects with the existing regional system it will be possible to take advantage of, and build upon, the personnel of the New York City system. The present system consists of nineteen reservoirs controlling runoff from 1,969 square miles of watershed in eight counties, with three major transmission aqueducts. The New York City Bureau of Water Supply has developed considerable managerial and engineering expertise in operating this large and complex system. This expertise could be applied to operate future projects if they are integrated with the present system.

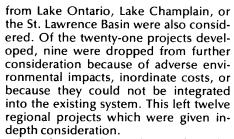
One of the water supply possibilities for Nassau County is to take water from upstate. In fact, it will not be possible to deliver water from upstate to Nassau County until New York City implements the fourth stage of the third city tunnel. This transmission facility is planned for completion by 1985 and is considered essential to adequately supply the New York City borough of Queens.

A regional design for increased transmission capability could be used to supply Nassau County. Moreover, a regional design with surplus transmission capability to Long Island opens the possibility of the conjunctive use of the upstate water system and the Long Island groundwater reservoir.

This offers exciting possibilities. It should be studied in depth by the regional corporation and, if feasible, implemented.

THE REGIONAL PLAN

In order to supply the anticipated regional deficits, the Southeast Water Supply Commission developed twentyone possible project proposals. These proposals include projects in the Delaware, Susquehanna and Hudson River NASSAU Basins. The possibility of diverting water



In order to make a selection from the twelve possible regional projects, they were built into several regional plans. Each regional plan was designed to meet the public water supply deficits through the year 2020. The best of the regional plans was then selected.

The first phase of the recommended plan, to be constructed by 1985, would increase the capability of the system by 280 million gallons per day at a cost of \$550 million. It would consist of a sixteen foot aqueduct from Hyde Park on the Hudson River to the West Branch Reservoir of the existing Croton system. At Hyde Park water treatment and pumping facilities would be constructed.

This first phase would enable flood skimming of the Hudson in conjunction with operation of the existing Delaware system. During the wet six months of the year, from December through May, flows on the Hudson River are adequate to allow withdrawals from the Hudson River. During this wet six months, a large amount of water would be withdrawn from the Hudson River and transmitted to West Branch Reservoir. During the same six months of the year, only a small amount of water would be taken from the Delaware system, allowing the reservoirs to fill to capacity. During the dry six months of the year, from June through November, no water would be taken from the Hudson River and the Delaware system would be drawn upon to its complete capacity.

This mode of operation between the Hudson River and the existing Delaware system would increase water supply capabilities without requiring any dams or reservoirs.

The complete first phase plan would include, in addition to the Hudson River withdrawal, the adoption of conservation measures, particularly the metering of all consumers, the provision of transmission capability to Queens and Nassau Counties, the development of major recharge capability and facilities in Nassau County, and development of certain local projects.

The first phase of the plan would be adequate until approximately the year 2005. By that time it might be necessary to again increase supply capabilities. This would be done by extending the aqueduct from West Branch to Kensico Reservoir, giving a completed aqueduct from Hyde Park on the Hudson River to Kensico Reservoir just north of the City. Flows in the Hudson River would be augmented by expanding the existing Hinckley Reservoir in the Mohawk River Basin. By expanding Hinckley Reservoir it would be possible to maintain a larger constant flow of fresh water in the Hudson River at Hyde Park. The Hyde Park facility would then be able to supply 500 MGD to the system. This second phase of the plan, costing \$350 million, would be capable of supplying the water supply needs of the southeastern New York region through the year 2020.

This plan for supplying the Region would make the most efficient use of the existing water supply facilities and has been staged to meet needs only as they develop. The plan would, moreover, have minimal environmental impacts. The environmental impacts due to withdrawing large amounts of water from the Hudson River would be limited.

In order to determine the environmental impacts of withdrawing large amounts of water from the Hudson River, the Commission asked the Boyce Thompson Plant Institute to prepare a preliminary environmental impact statement. On the basis of this preliminary environmental impact statement, it is felt that the Hudson could be developed for water supply in the southeastern New York region without adverse environmental effects upon the Hudson River estuary. If a further increase in supply is needed, the Hinckley proposal would have a localized but significant environmental impact.

agencies. In Nassau, the Department of Public Works is the de facto water agency. If they were to adopt strong roles, they potentially could foster intermunicipal cooperation to develop sources outside the jurisdiction of small systems, encourage economies of scale and help reduce discrepancies among various systems in service and rate levels. Yet, with the exceptions noted above, there has been little county activity in actual water supply. For a new regional configuration to be successful, this must change.

NEW YORK CITY

- 17. It is recommended that New York City become part of a new regional configuration so that its water supply needs can be met in a timely and equitable manner. (See recommendations 1 through 5)
- 18. The City should immediately reexamine the present policy and operating procedures relating to the timing and volume of releases from its reservoirs in order to maintain reasonable environmental conditions consistent with water supply needs and local concerns. (See recommendation 24).

The New York City system is by far the region's largest "local" institution. It is in fact quasi-regional in terms of facilities, but local in terms of attitude and decision-making. Since 1834 it has responded to the needs of its citizens by successively developing out-of-city sources in Westchester, Putnam, Ulster, Sullivan, Greene, Schoharie and Delaware Counties. In two of these counties, Westchester and Putnam, water sources have been largely pre-empted by the City's Croton system.

The Water Supply Act of 1905, which authorized further source development by New York City in counties to the west of the Hudson River, led to completion

of the Catskill and Delaware systems. The Act also authorized creation of the Board of Water Supply to plan, design and construct those and all subsequent City water supply facilities. Operation and maintenance of these facilities are the responsibilities of the other arm of the New York City system, The Department of Water Resources.

At this time the New York City system supplies water to 7.2 million residents within the City as well as to consumers in 60 municipalities in Westchester, Putnam, Ulster and Orange Counties. In 1971 it supplied 1,424 million gallons per day to customers in the City and another 87 million gallons per day to upstate municipalities.

Approximately 75 per cent of the water consumed in the City is not metered. Most residential customers are on a flat dustrial accounts are metered.

deficit into a revenue producing endeavor. In 1970-71 it realized a profit of \$87 million. This was accomplished through the raising of water rates on two separate occasions in recent years. As in other cities and villages surpluses are deposited in the general fund and may be used for other than water supply purposes.

A significant cost of providing water, a cost not experienced by most water supply systems, is the tax paid by the City on its facilities upstate and in Nassau County. These taxes comprised approximately 10.5 per cent of the City's total operating costs in 1970. They are noted in the following table.

Customers in New York City have been served reliably and well by this extensive water supply system. However, the City system in achieving this service has fallen short of a regional perspective rate basis. However, commercial and in- to match its size. Its relationship with those upstate communities which it is re-New York City has succeeded in turn-quired to serve in return for City deing its water supply operations from a velopment and use of reservoirs and

TABLE 6 TAXES PAID BY NEW YORK CITY TO OTHER MUNICIPALITIES (INCLUDES SCHOOL DISTRICTS)

BY COUNTY (in dollars) 1970

County	Taxes
Delaware County	1,742,466
Dutchess County	85,708
Greene County	2,135
Nassau County	416,262
Orange County	6,552
Putnam County	1,291,779
Schoharie County	557,284
Sullivan County	1,279,692
Ulster County	3,412,675
Westchester County	4,074,655
Total	12,869,208

ore and more water supply facilities throughout the Region now demand a regional approach to meet future needs.

There actually are 619 water supply systems in the region, including 481 community water systems and 138 single property systems serving institutions, apartments, temporary residences and trailer camps. The focus of this chapter is on the 481 community water systems.

Some 244 of these systems are considered major systems, serving over 1,000 people or being publicly owned. They serve 99 per cent of all those using publicly supplied water in southeastern New York. A few of these systems are dominant. The ten largest systems serve 9.9 million people or about 80 per cent of those using public water. By far the largest of these is the New York City system.

Approximately 96 per cent of southeastern New York's 12.2 million people are served by public water supply systems. The majority of these people are in New York City. On Long Island 2.4 million people are served by public water, while 1.5 million receive it upstate.

COUNTIES

- 16. Each county should establish and maintain a strong county water, sewer and drainage agency. This agency should:
 - A) Develop a county water supply plan and update biennially
 - B) Create county wide or part county water districts as needed
 - C) Manage and operate any water supply facilities constructed by the county
 - D) Insure that future water supply developments conform with the county plan
 - E) Provide technical services to local town, village, and city sys-
 - F) Manage and operate water supply facilities at the request of local government units
 - within the county. The county should be the sole buyer of for resale to local systems

- H) Act as liaison to any regional water resources board or agency established
- I) Develop a plan for the transfer of unsatisfactory investor owned systems to public ownership and operation and be prepared to take the operating responsibility
- J) Integrate water supply facilities, sewage collection facilities and urban drainage facilities into a complementary and mutually supportive system on a county wide basis.

One level of local government—the counties—has not yet taken much responsibility for water supply needs, despite its legal authority to become more active. This is slowly changing, due to the impetus of the problems brought to the fore by the drought of the mid-sixties and by the county, state and federal studies that have been conducted since that time. Most agree that counties should become more active in water supply.

Still, county involvement has been minimal. Only in Suffolk County, the home of the Suffolk County Water Authority, is there a county-wide response to water supply needs. The Authority supplies water to over 75 per cent of those people in the County who use publicly supplied water.

A major element in the effort to push the counties into a stronger water supply role have been the state-sponsored Comprehensive Public Water Supply (CPWS) Studies. All the region's counties, except Dutchess, which produced its own study earlier, have conducted a CPWS Study. A more active county role in water supply has been a nearly unanimous recommen-

There is no formal mechanism to implement CPWS study recommendations, but there has been some movement in this direction, primarily in Orange and Westchester Counties. Orange County has embarked on a program of purchasing land for reservoir sites which were identified in its CPWS Study. Westchester County is developing a water G) Act as the liaison between a supply plan for the county. It also has regional supplier and all systems created two water districts, though the function of these districts has been soley to provide transmission and interwater from the regional supplier connection capability, not supply or distribution.

Although the right to become more involved in water supply exists in other counties through coordination of local water supply services or establishment of county water districts, for example, little has been done in this regard. Nassau County in particular has a provision in its charter giving the county authority to transfer the water supply function from local municipalities to the county. This authority hasn't been exercised. In other counties, a complete transfer of function would require majority votes in all cities taken together, all towns taken together and all villages taken together.

This obstacle undoubtedly constrains any county attempt to take over the entire water supply function from other municipalities. A more immediate constraint, however, which inhibits any kind of more active role for several counties in the region is New York City's interpretation of the Water Supply Act of 1905. Under this Act, "municipalities" in the counties of Westchester, Putnam, Ulster and Orange have a de facto right to buy water from the New York City system in return for the location of New York City sources or transmission mains in those counties. However, the City refuses to recognize counties as "municipalities" and thus refuses to sell water to counties or county water districts. At the same time, it has pre-empted much of the water sources in such counties as Westchester and Putnam. Consequently, the county level of government, unable to either buy water from the City system or to develop its own water sources, has little incentive to become more actively involved.

Yet, other counties unaffected by the New York City system have not moved to strengthen their roles, even Rockland County, geographically isolated by rugged terrain and historically oriented to Northern New Jersey, is dominated by a large private water supplier. Dutchess County, which has no relationship with the New York City system, has a number of small water systems. Within the county, however, a large system does serve the needs of residents of both the city and town of Poughkeepsie.

All of the counties in Southeastern New York do have county water

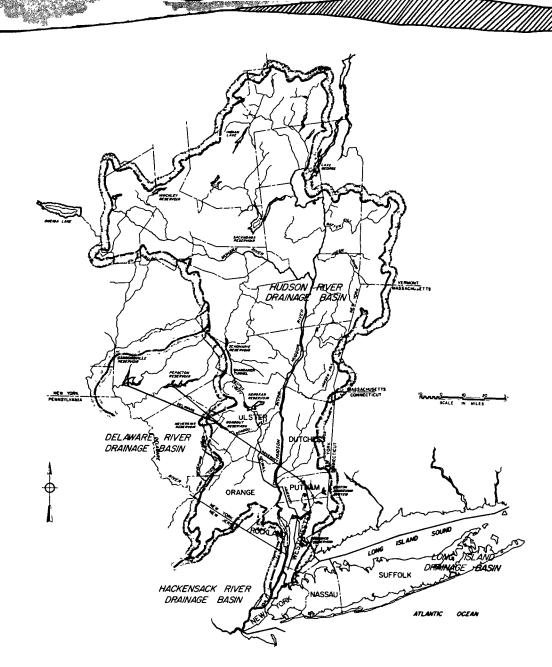


FIGURE 4 **EXISTING NEW YORK CITY WATER SUPPLY SYSTEM**

CHAPTER 4 LOCAL INSTITUTIONS

INTRODUCTION

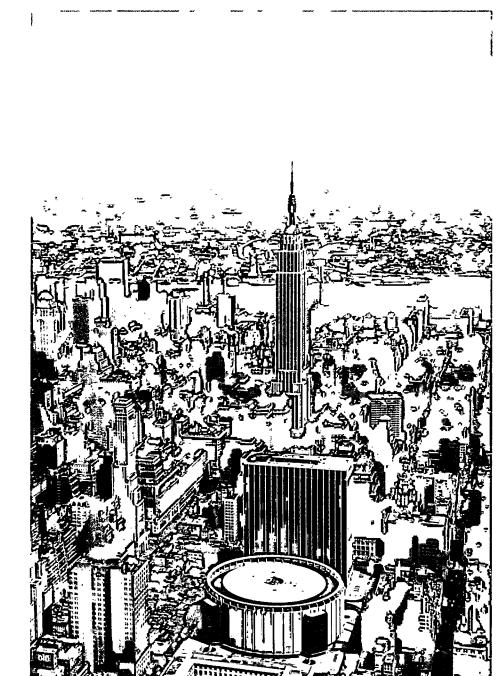
15. Meeting the water supply needs of southeastern New York calls for consolidation services and facilities on the city, town and village levels; providing for the meeting of development needs; phasing out of unsatisfactory developer type systems; integrating the planning and operation of all urban water services; greatly strengthening the county role in water supply and urban water services; and establishing a new regional configuration and format to meet future water needs.

The two prime functions of water supply are development of water sources and distribution of the water. At a minimum, this requires financing, construction and operation of water supply service facilities. Historically, these activities have been the province of local governments and institutions.

In the absence of meaningful regional or even county-wide planning, the forces of growth have inspired a crazy-quilt pattern of water supply services. City, town, village and investor-owned systems—a total of 481 community water systems—are the responsible entities.

These include a proliferation of private development systems, many of which are clearly inadequate, but are characteristic of urbanizing areas, serving small housing developments populations. Most serve fewer than 1,000 persons. At the county level, meanwhile, water supply services are still with few exceptions insignificant. In between are city, town and village systems of different sizes and ages and with different costs to the consumer. In a few cases special governmental units—authorities and joint water works—have been created to respond to broader water supply needs.

It is this fractionalized configuration that will not be able to cope with what has become regional need. The growth and shifting economic and population patterns which over the years stimulated



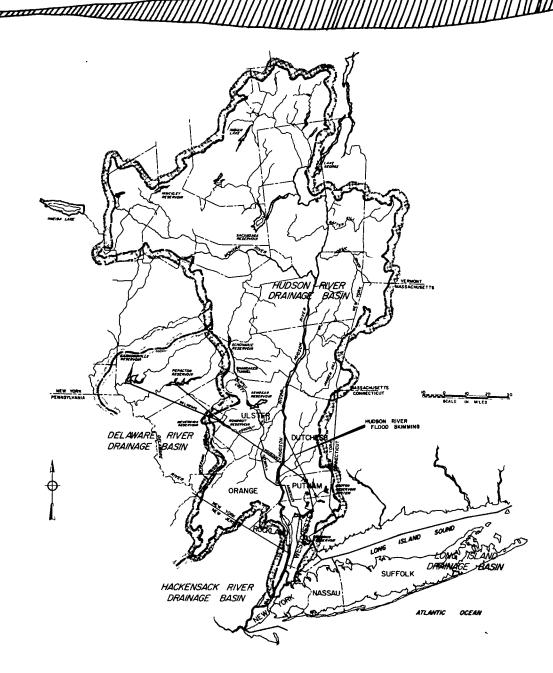
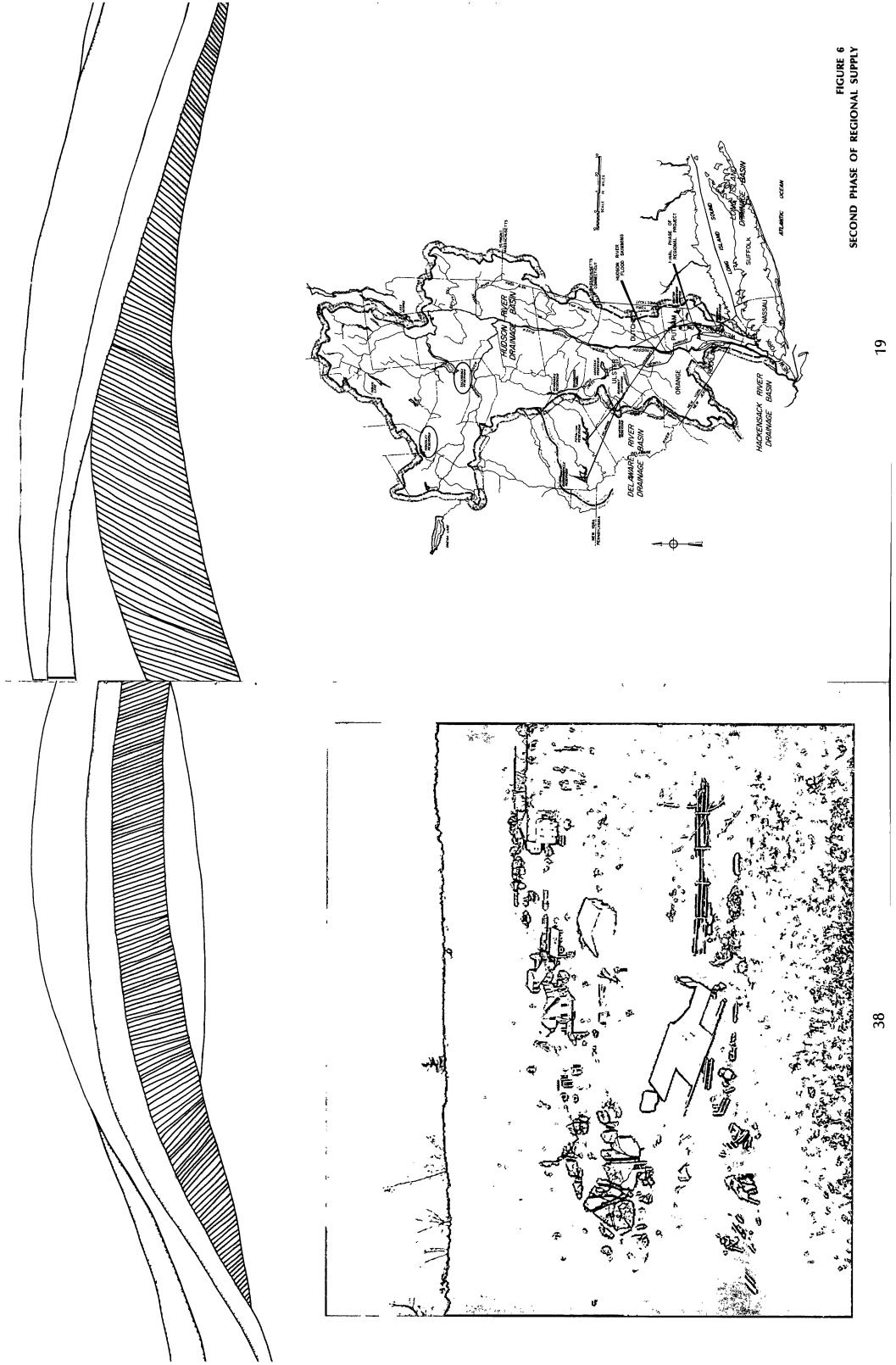


FIGURE 5
FIRST PHASE OF REGIONAL SUPPLY



The existing dam at Hinckley will be raised by 50 feet and increase the storage volume by 90 billion gallons. This will flood an additional ten thousand acres, of which nine thousand are in the Adirondack Park. A large area of coniferous forests and open agricultural areas will be cleared and flooded.

On the plus side, with additional storage volume at Hinckley, there will be fewer and less severe drawdowns in the reservoir. This will contribute to improved warm water fisheries and aquatic plant life. The larger lake could be used for recreation. The expanded reservoir will give improved low flows and improved water quality on the New York State Barge Canal, the Mohawk River and Hudson River down to Hvde Park. Overall it is felt that expansion of Hinckley Reservoir could be done with a minimum of adverse environmental impacts. If the recreational potential is included, the environmental impacts frequent and greater drawdowns in the could be considered beneficial.

TABLE 1

Another plan also viewed guite favorably by the Southeast Water Supply Commission would involve reregulation of the existing Sacandaga Reservoir in the upper Hudson Basin. This plan would have the same first phase as the above plan. However, the existing Sacandaga Reservoir would be used in place of the expanded Hinckley Reservoir.

Sacandaga Reservoir is presently owned and operated by the Hudson River-Black River Regulating District for flood control, recreation and hydroelectric purposes. It is technically possible to make public water supply one of the uses of Sacandaga Reservoir by changing the operating procedures. The changed mode of operation would increase flows in the Hudson River at Hyde Park by 500 million gallons per day.

However, the new operating procedure would also make Sacandaga less attractive for recreation because of more reservoir. There might be some loss of

RECOMMENDED REGIONAL PLAN

		Hyde	Park Diversion
PROJECT	Universal Metering in New York City	Flood Skimming to West Branch	Expansion of Hinckley Reservoir, Sustained Withdrawa to Kensico Reservoir
COMPLETION DATE	1985	1985	2005
YIELDS—MGD ¹			
By Project	240	280	220
Cumulative	240	520	740
	cc	STS-MILLIONS	S OF DOLLARS
CAPITAL COSTS			
By Project	\$93.7	\$541.3	\$343.8
Cumulative	\$93.7	\$635.0	\$978.8
ANNUAL COSTS ²			
By Project	\$ 8.9	\$ 44.9	\$ 27.2
Cumulative	\$ 8.9	\$ 53.8	\$ 81.0

¹ Millions gallons per day

existing flood control benefits. The potential loss of recreational uses and flood control benefits has kept the Commission from recommending this project.

Because of the uncertainties in using Sacandaga Reservoir for public water supply, the Commission has recommended the plan which includes expanding Hinckley Reservoir. Either plan, however, assumes universal metering for New York City, and both plans will require construction of an aqueduct from Hyde Park to West Branch Reservoir plus pumping and treatment facilities at Hyde Park by 1985. If further study shows that Sacandaga Reservoir can be used for water supply without damaging flood control, hydroelectric and recreational uses, the plan to reregulate Sacandaga Reservoir could be implemented rather than expanding Hinckley Reservoir

In summary, the water supply plan recommended for the southeastern New York region includes universal metering for New York City, construction of withdrawal, treatment and pumping facilities at Hyde Park on the Hudson River and an aqueduct from Hyde Park on the Hudson River to West Branch Reservoir by 1985, provision of transmission capability to Long Island, the development of a major recharge capability and facilities in Nassau County, and development of certain local projects. In 2005, the plan could be added onto by expanding Hinckley Reservoir and completing the aqueduct from West Branch Reservoir to Kensico Reservoir.

If the broad total program, particularly conservation and education efforts, is effective it may well be that projected needs will be less than anticipated. If this happens, phase two could be postponed for a number of years or even indefinitely. On the other hand, if projected needs develop faster than projected, which is the historical experience, then phase two could be brought on line sooner It is our feeling that the latter condition is highly unlikely if the conservation and education efforts are vigorously pursued.

To take advantage of this flexibility it is absolutely essential that the regional needs be continuously reviewed and analyzed. Only then will changes in needs be detected soon enough to allow the

the Regional system. Nassau County will then have the option to either expand its groundwater recharge program or draw supplies from the New York City System.

THE MID-HUDSON SUBREGION

A thorough study was made of all projects previously proposed for each of the counties in the mid-Hudson subregion. This was done to determine which projects were feasible and provided the most efficient means of supplying counties' needs. The intention was not to develop project recommendations. Rather, the intention was to determine the resource capabilities of each county. The county project proposals are not offered as recommendations. They are offered to demonstrate that a county has the capability of developing the specified levels of supply within the county more economically than taking water from a regional sys-

The water supply deficits for the Mid-Hudson Subregion are shown in the accompanying figure. These deficits represent the difference between anticipated water supply needs and the presently developed capabilities of supply. To meet these anticipated deficits there are limited water resources available in the Mid-Hudson counties.

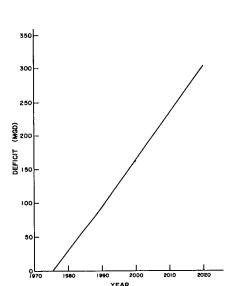


FIGURE 9 **PUBLIC WATER SUPPLY DEFICITS** NEW YORK CITY

Much of the available water resources in the Mid-Hudson counties has already been developed to supply New York City. The Croton watershed which drains most of Westchester County and a portion of Putnam County has been developed for New York City. Portions of Ulster County have also been developed as part of the City's system. These previous developments leave very little surface water which can be economically developed in the subregion. There are exceptions in Orange and Rockland counties where some surface waters can be developed to meet at least a share of the counties' deficits.

The groundwater capabilities in most of the Mid-Hudson counties are minor and limited to small local development. The exception to this is in Rockland County where approximately 8 MGD can be developed from aquifers in the County.

From this analysis of county potential the following conclusions were reached.

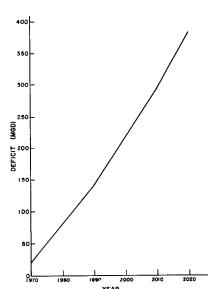


FIGURE 10 **PUBLIC WATER SUPPLY DEFICITS** MID-HUDSON SUBREGION

Orange County will be able to develop up to 40 MGD of water supply from projects within Orange County. These developments will be adequate to supply the County through the year 2000. Any deficits beyond this point will have to be supplied by a regional supply.

It was concluded that Rockland County has the capability of supplying all its public water supply needs through the year 2020 from projects constructed within the County. Therefore Rockland County will not require water from a regional supply. Nevertheless, it is thought necessary to include Rockland County within any institutional arrangement for the southeastern New York region. This would allow Rockland County to take water from a regional system if and when it becomes necessary. It seems most likely that the Hudson River will be used as a future water supply source for the southeastern New York region. Inasmuch as Rockland County is a riparian county to the Hudson River, it is appropriate to include the County in any regional scheme.

Other than in Nassau, Suffolk, Orange, and Rockland Counties, no other county has water resources which may be efficiently developed to supply the deficits of the county. When the capabilities of county supply in the counties of Suffolk, Nassau, Orange and Rockland are accounted for, and when universal metering for New York City is assumed, there still remains a public water supply deficit.

These regional deficits will amount to 175 MGD by 2000, and 480 MGD by 2020.

When all the local possibilities of supply are accounted for, there remains a sizable water supply deficit in the Mid-Hudson counties. These remaining deficits will have to be supplied from outside the counties and have been included in the deficits to be supplied by the regional system described in the first chapter.

² Annual costs include amortization, interest (40 years at 5.5%), taxes, operation and mainte-

purpose in function. It is valuable for water supply in that as a storage reservoir, it evens out the availability of water between wet and dry periods. Its vastness serves to make water available at locations required. It can be used for sewage disposal at the same time it is used for water supply if the proper technology is applied.

In the New York City section of Long Island, the groundwater is used in only a small section of Queens. This section is served by the Jamaica Water Company and the Utilities and Industries Corporation. It is anticipated that the New York City Department of Water Resources will eventually take over these two companies and supply the service areas with upstate water. This leaves Nassau and Suffolk Counties which presently and in the future will draw upon the Long Island groundwater aquifer.

Although it is anticipated that Suffolk County will have the largest population increase of all the counties in the Southeastern New York Region, the water supply situation in that county is not critical. The anticipated water supply needs for Suffolk County will be 400 MGD in 2020. The permissive safe yield of the groundwater aquifer beneath Suffolk County is greater than this and will allow the County to meet its needs from local sources. The Suffolk County Water Authority has the capability of developing these local sources in an efficient and timely manner to meet the needs as they

The development of the Long Island aquifer beneath Suffolk County to meet water supply needs may, however, result in some problems. Withdrawing large amounts of water to meet the anticipated water supply needs will result in lowered groundwater tables, or will cause reduced streamflows and lowered lake levels. There will also be a reduction of freshwater flows to the bays surrounding Suffolk County, which might affect their ecological balance. All of these problems will be exacerbated by sewering programs which dispose of the sew-

be degraded as untreated sewage is contributed to the aquifer. With the sewering program water quality degradation is abated but the water quantity is severely reduced.

To avoid either water quality degradation or severe water quantity reductions, it is necessary for Nassau County to eiage through ocean outfalls and result in their recharge highly treated wastewater effluents or to import water to the These possible problems indicate that county, probably both. It is not reasonwater supply development in Suffolk able to expect that Nassau County will County will require a coordinated apbe able to obtain water from Suffolk proach and a constant appraisal of envi-County. Any imported water must, therefore, come from upstate. This can only mize damage. To minimize lowered be done by taking water from the New York City system. New York City will not have the transmission capabilities of suprecharge highly treated sewage to the plying Nassau County until after 1985.

Until then the only way Nassau County will be able to meet its needs will be to recharge highly treated wastewater to the groundwater aquifers or to mine groundwater. recharge capability of 70 MGD should be developed as soon as possible in order to allow the county to supply its needs from the groundwater without overdrafting the groundwater aguifer beneath the County. This 70 MGD capability, costing \$115 million, would supply the County through 1985 or 1990. By that time increased transmission capabilities to Queens and Nassau will be possible under the regional program. This increased transmission capability will make it possible for Nassau County to be supplied with water from

YEAR

FIGURE 8 **PUBLIC WATER SUPPLY DEFICITS** LONG ISLAND SUBREGION

appropriate change in project timing. Futhermore, it is essential that a regional institution be created that can be held responsible for such review and analysis. The new regional agency is also needed to provide a broad regional orientation and to fully implement the total programs of public education, conservation measures, universal metering, integrated operation and development of new facilities.

PERSPECTIVE AND APPROACH

3. In order to implement the proposed program a new institutional arrangement for the region is recommended. The southeast region is faced with the need for a new regional perspective and approach. Most of the counties and the city have water supply problems that can only be approached in a regional context. Most of the counties and the city individually lack the capability to cope with the increasing water supply needs, coupled with the environmental complexities. New sources of supply, improved transmission capability, effective use of the water resources, urban water resource integration, environmental responsiveness and regional development are some of the major elements that require a new regional outlook and approach.

RECOMMENDED REGIONAL **APPROACH**

4. It is recommended that a regional Southeast Water Facilities Corporation be established by special act of the legislature with an effective date of April 1, 1976. The corporation would be a self supporting instrumentality of the state and would plan, develop, construct and operate the recommended water supply facilities for the region. The corporation would take over New York City upstate facilities and operate these facilities in an integrated manner with the recom-

This recommended approach would make most effective use of the available water resources and existing water facilities, maximize economies of scale and operational efficiency, best serve the needs of source and service areas, and introduce a high level of environmental responsiveness.

agency will provide a transition period of two years from the present arregional approach to replace the ad hoc rangements to the new southeast process that has been employed until water facilities corporation. The agency will be charged with the re-

5. It is recommended that an implement-

ing agency be created by the legisla-

ture effective April 1, 1974. This

sponsibility for effecting a smooth and

orderly transition to enable the corpo-

PERSPECTIVE AND APPROACH

short period of time.

regional supply system.

Deficiencies in Regional Arrangements

ration to become operational in a Only in the case of New York City does water supply begin to take on a regional perspective, and this is the result of a statutory mandate rather than a recognized need to cooperate. Its regional role was mandated by the Water As important as the plans to provide Supply Act of 1905, which permitted the the region with adequate water through City to meet its water needs by expanding the rest of the twentieth century and its system into other counties, but rebeyond is the arrangement of inquired in return that it provide water to stitutions to assure that the plans are municipalities (and, by amendment, fairly and efficiently carried out. The water districts) in counties where the powers and responsibilities for imple-City's facilities are located. Counties menting the plans must be clearly aswhose municipalities have a de facto signed to agencies with the capability and right to take water from the City systems perspective to match the dimensions of a are Westchester, Putnam, Ulster and Orange, as well as Delaware, Schoharie, Sul-Currently, as Chapter IV will show, the livan and Greene outside the study area.

region's water supply needs are met with Out of this mandated trade-off have a jig-saw puzzle of institutional arrangearisen major areas of conflicts between ments that operate, at best, inefficiently. New York City and its upstate customers, This mix of institutions, including city, including disputes over water rates, per town, village and investor-owned syscapita limitations and recognition of tems, developed over the years in ad hoc counties as municipalities. These confashion to meet individual group water flicts are at least partly the result of needs. The result has been diversity: dithe New York City system's penchant to versity in the degree of involvement and plan primarily to meet the City's needs. functions performed by various levels of with little voice or representation offered government, in the types of institutions to upstate customers. The attitude of the responsible for the area's water systems, City has been to treat the upstate customers as an undesirable burden, while the and perhaps most importantly, in levels upstate areas feel that the City should be of service and consumer cost. This diverrequired to meet their water needs.

The conflict is reflected in water rate disputes. Under the Water Supply Act the City is required to furnish water at the aqueducts or reservoirs for the cost to the City at the point of delivery. The City in 1967 tried to raise the rates, but the upstate communities refused to pay, and the issue went to the State Department of Environmental Conservation where the position of the upstate communities has been upheld.

Similarly, the City's application of the language of the Water Supply Act of 1905

mended projects.

agency in southeastern New York with a genuinely regional perspective. This perspective, however, is forcing itself into the region's picture precisely because few of the area's local or county jurisdictions have sufficient sources within their individual boundaries to meet future water supply needs. Thus, the southeast region is faced with the need for a new

regional need.

a net reduction of water in the aguifer.

ronmental effects in order to mini-

groundwater tables it may be necessary,

at least at some point in the future, to

groundwater rather than disposing of it

to the ocean. The Department of Environ-mental Control in Suffolk County has al-ready explored this possibility.

In summary, Suffolk County has the

resources to meet its water supply needs

locally. It has the administrative capabil-

ities of developing these resources in an

efficient and an environmentally respon-

sive manner. The environmental con-

sequences, however, are such that the

groundwater aquifer beneath Suffolk

County cannot be used for long term

water supply needs outside of Suffolk

County. The groundwater aquifer, man-

aged with care, is adequate for the water

supply needs of Suffolk County. It is not

adequate to meet needs outside the

In contrast to the situation in Suffolk

County, the water supply situation in

Nassau County is the most imminent

problem in the Region. The permissive

safe yield of the groundwater aguifer be-

neath Nassau County is approximately

151 MGD. The County's consumption is

already at this level. Continued with-

drawal above the permissive safe yield

level will result in groundwater mining.

Moreover, there are some water quality

problems in the Nassau aquifers. These

problems result from the disposal of

household waste through individual

cesspools and septic tanks into the

groundwater aquifer. To abate the water

quality problem, the county is presently

involved in a sewering program. This proj-

ect will collect the sewage, treat it and

dispose of it through ocean outfalls. By

disposing of it to the ocean there is a net

reduction of water in the groundwater

aguifer and all the problems of ground-

Thus, without the sewering program,

the groundwater quality will continue to

water utilization will be exacerbated.

county.

in methods of financing water systems.

sity, in turn, has generally precluded a

unified effort to meet what has become a

In fact, there currently is no water





LOCAL PROJECTS



Daily Per Capita Usage
177'
185
121
92
121
115
72
99
113
127

¹ Includes the two investor-owned companies, Jamaica and Woodhaven Division of Utilities and Industries.

has stirred antagonism in two other cases. As Chapter IV will discuss more fully, the City is able to limit its supply of water to upstate areas in a way that falls short of the needs of a small community trying to attract new industry and gain economic growth. This is despite the fact, as Table 2 shows, that the upstate service area as a whole, or by county, consumes less water per capita than does New York City.

By refusing to include counties within the law's definition of municipalities, the City is not required to sell water to any county water agencies that might be formed. This discourages the consolidation of local water supply services at the county level, and has inhibited strong county water roles.

In addition to these regional frictions, New York City has been criticized for a lack of environmental responsiveness in planning and operating its water supply facilities. The mid-sixties furor over the proposal, which was defeated, to construct a reservoir on the upper Hudson in the Adirondack Park (Gooley Number

has stirred antagonism in two other cases. As Chapter IV will discuss more fully, the City is able to limit its supply of water to upstate areas in a way that falls short of the needs of a small community agement tool.

1) is a case in point. Moreover, the City has steadfastly refused to implement universal metering of water consumption, an essential conservation and water management tool.

All in all, the New York City system, while producing a reliable water supply for some 7.8 million people and competently serving customers within its boundaries, has adopted a perspective that is less than regional.

This deficiency takes on added importance in light of the shifting population and economic patterns of the southeast region. New York City, while dominating the regional water supply, is accounting for a decreasing proportion of the region's population. In 1950, the study area outside of New York City accounted for only 21 per cent of the region's population, but in 1970 this grew to 35 per cent, and by 2000, this proportion is projected to rise to 47 per cent—26 per cent in the Nassau-Suffolk subregion and 21 per cent in the Mid-Hudson subregion. These counties thus are faced with a difficult task of providing their residents

with enough water. The present inflexible arrangements with the City compound the problem.

At the same time, the counties in neither of the study area's subregions—the Nassau-Suffolk subregion or the Mid-Hudson subregion—have undertaken a consolidation of services to help solve common problems or take advantage of economies of scale. In the Nassau-Suffolk subregion, Nassau is in immediate need of additional water, while Suffolk has a plentiful supply. But there apparently is little chance that Suffolk will agree to export water to Nassau, despite a regional planning board recommendation for a single, regional water authority to serve the two counties.

Within the six-county Mid-Hudson subregion, regional efforts also have been non-existent. The sub-region is surfeited with 464 public water supply systems. Only about one-third of these serve more than 1,000 people. Many of the water supply systems are investor-owned development systems with little or no fire capacity, with part-time operators and inadequate financial resources.

The State (see Chapter VII) has a relatively comprehensive water resources program and might feasibly encourage a remedy to the southeast region's fractionalization. In a regional context, however, State planning in the study area has amounted to permission for New York City to expand its system beyond its own boundaries, pre-empting the water resources of several upstate counties in the process. One attempt by the State Department of Environmental Conservation to establish a regional water resources planning board in the Nassau-Suffolk subregion failed. In general, State-sponsored regional water resources planning has to date eluded the southeast region.

The State, through its Constitution and enabling acts, does permit and encourage intermunicipal cooperation in developing and providing services. Besides the New York City system, there are 27 formal multi-system water supply utilities that serve two or more municipalities or districts.

in the Nassau-Suffolk subregion and 21 per cent in the Mid-Hudson subregion. These counties thus are faced with a difficult task of providing their residents A regional perspective, however, involves the inter-county rather than merely inter-municipal transmission of water, and, within that framework, a fair

NORTH

LONG ISLAND SOUND

ATLANTIC OCEAN

Boy ATLANTIC OCEAN

OCE

EXPLANATION

Movement of treated waste water

Salt water of ocean

sound, and bay

Consolidated rock

T

Tertiary

sewage-treatment

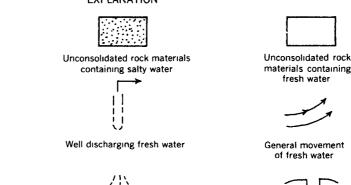


FIGURE 7
INJECTING TREATED WASTEWATER
THROUGH RECHARGE BASINS

Recharge basin

NASSAU COUNTY

12. A project to furnish additional water for Nassau County must be developed as soon as possible to meet a critical water deficit. A groundwater recharge project using renovated wastewater in an amount up to 70 million gallons per day should be undertaken immediately. (See also recommendation 29.)

The Regional Corporation should provide for the importation of upstate surface water by 1985 through project development.

ROCKLAND, ORANGE, AND SUFFOLK COUNTIES

13. Proposed local projects should be implemented as need dictates providing they are acceptable locally.

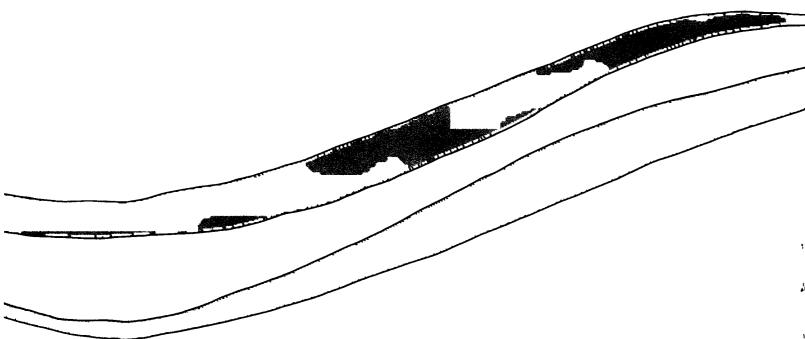
NEW YORK CITY AND ULSTER, DUTCHESS, PUTNAM, AND WESTCHESTER COUNTIES

14. The water needs of these areas will be met by the proposed regional project.

LONG ISLAND SUBREGION

The anticipated water supply deficits for the Long Island counties of Nassau and Suffolk are shown in the accompanying figure. All of Long Island is underlain by geologic formations which provide a vast storage reservoir and a prolific source of water. In fact, the Long Island groundwater aquifer is the only source of water on Long Island; surface water is insignificant. The Long Island aquifer supplies fresh water to the bays surrounding Long Island and is used for water supply and waste water disposal.

These functions are interrelated. For example, use of the aquifer for sewage disposal can make it unfit for water supply, or removing large amounts of groundwater for water supply can diminish the fresh water flow to the Long Island bays. However, if these inter-relationships are recognized and accounted for, the aquifer can continue to be multi-



consumer demand through higher prices. Before there can be any rational retail pricing policy in New York City, it will be necessary to institute universal

In summary, using the price of water to affect total average needs has limited potential. But, water pricing can be a management tool, and will have some effect on peak water requirements. Before there can be a valid pricing scheme for New York City it is necessary to have universal metering.

PUBLIC EDUCATION

11. A long range public education campaign should be undertaken by the schools, municipalities and water supply institutions, relative to the importance of water and the need to use it wisely. It should be part of the current development of programs related to environmental management and conservation.

> In times of crisis, such as occurred in the 1960's, a crash campaign coupled with symbolic and substantive water use restrictions was undertaken. Such efforts, while outstanding successes, cannot be sustained for a long period of time or in times of water plenty.

As with other conservation efforts, universal metering is a necessary precondition if any long term educational program is to be credible and

During the drought of the mid-sixties the region faced a severe water shortage. In response to this critical situation, water use restrictions were imposed and a public water conservation campaign was undertaken.

The results of the drought campaign were dramatic and water consumption

basis. That is, each consumer is charged a dropped by as much as twenty per cent. fixed amount no matter how much water
The education campaign was so successhe uses. This makes it impossible to affect ful that more stringent restrictions and conservation measures were unnecessary. Shortly after the shortage was declared over, however, consumption returned to normal.

> It is doubtful whether the public would continue to conserve water in response to an education campaign after the drought was declared over. The success of the campaign capitalized on the crisis atmosphere of the drought. The education campaign was a short term response to a short term problem.

> To be effective in the long run, an educational program should not be crisis oriented but should be designed to change basic attitudes. The scope of water supply problems, the alternatives available to meet the supply needs, and the costs of projects should become part of the public's understanding. The costs of projects including environmental and aesthetic costs should be presented.

> Many of the water conservation measures discussed in this chapter will require public cooperation in order to be effective. The public must be made aware of the availability of water saving fixtures and devices before they can be expected to take advantage of them. The amount of water being wasted through leaky plumbing in apartment buildings must be made known to apartment building owners before they will move to make repairs. Most important, the efficiency and necessity for universal metering in New York City must be explained and made known to consumers in the City. Without being made aware of the potential, it is doubtful whether consumers in the City will cooperate in any type of universal metering program.

In order to gain their cooperation and to make them aware of public water supply programs, a public education program is indicated for the Southeastern New York Region. This public education

program should first of all explain what is involved in public water supply. They should know where the water comes from, how it is treated, and how it is made available to the consumer, and how much it costs to make it available. They should know what they can do to more efficiently use the water that is made available to them. The program should start now in order to gain the necessary cooperation needed for universal metering in New York City.

Therefore, the Commission has recommended a public education campaign for the southeast New York region. This public education campaign should stress universal metering, water saving devices and other methods that consumers may use to reduce water consumption.

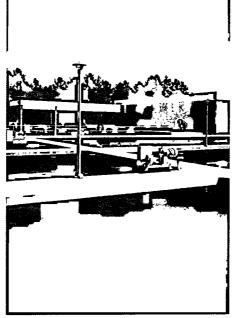


Photo courtesy of O'Brien & Gere

distribution of costs among all users, operation of the system based on the needs of all users, and representation of user and source areas in the decision-making processes of the system.

The full implementation of the total conservation, source development, education, integrated operation and research program requires a regional perspective along with responsibility, authority and commitment.

No institution in the southeast region fulfills these characteristics.

Justification for Regionalization

Regionalization of the area's water supply is justified not only by the fact that existing local jurisdictions lack sufficient water sources to meet their future needs internally, but also in engineering and administrative terms.

From an engineering and technical standpoint, it would be most inefficient for each of the counties to act independently and develop their own outside sources, even if they had the financial and technical capabilities to do so. There would be a duplication of effort, competition for the same sources, and problems of regulation and the allocation of water. It would not be possible to realize the economies of scale inherent in a large regional system.

A regional approach that intergrates additional water supply projects with New York City's existing upstate facilities would permit the use of the existing storage and transmission facilities to distribute water through the Mid-Hudson subregion. Such an integrated regional approach will avoid redundancy in facilities and will allow the most efficient timing of projects to meet total needs. This approach is also supported by the geography of the mid-Hudson subregion, since four of the six upstate counties, Ulster, Orange, Putnam, and Westchester, already are transversed by the Catskill, Delaware or Croton aqueducts. Moreover, an integrated regional system will make upstate water available to Nassau County, which faces the most immediate shortages, by making transmission capabilities available to the county.

Finally, by pooling the region's available water, an integrated regional supply system will give the best drought protection to the area. By bringing the regional supply of water under one arrangement and giving a larger total availability of water, situations where some customers have a shortage while others have plenty will be prevented.

Furthermore, a regional approach is justified and appropriate in administrative terms as well as technical.

Administratively, a regional approach to the provision of a public service is justified if it meets the following criteria:

1. JURISDICTION: The boundaries of the service supersede the boundaries of any given political jurisdiction. A regional jurisdiction for water supply would encompass areas with water supply capabilities as well as areas with water supply deficits, source areas as well as service areas, within the same jurisdic-

2. PROGRAM SCOPE: The scope of the program is sufficient to command the technical competence and equipment to discharge its public responsi-

3. COMPATIBILITY: The regional approach contributes to the total effectiveness of government. Conversely, competition among smaller units for scarce resources depreciates the efforts of these units taken as a whole.

4 FLEXIBILITY AND LONG RANGE RESPONSIBILITY: A regional approach permits overall appraisals and revisions according to changing needs and conditions, such as changing growth rates. It is strategically capable of advancing the area's program according to composite

5. FORUM FOR CONSENSUS: A regional approach brings together decision-makers from different areas and provides a vehicle for them to reach consensus on policy matters.

Generally, a regional approach should concern itself with area-wide problems, leaving local problems to local jurisdictions. While this indicates that local distribution of water should remain a local activity, it also demands that the largescale supply of water to these local distributors be recognized as an area-wide need, a function that weaves through the entire region and holds it together as a unit of interrelated activities.

RECOMMENDED REGIONAL APPROACH

water supply services. Whichever route manner with the existing facilities and

is settled on, several activities will have to be carried out:

- -Construction of new water supply facilities
- —Operation of these facilities
- -Operation of existing facilities, including the facilities of the New York City system
- -Establishment of a wholesale rate schedule and other operating and service policies
- -Transmission of water to all parts of the service area
- -Accumulation of capital to build and renovate water supply facilities
- -Planning for future development of the system
- -Implementation of conservation and education measures
- -Optimization of available water and fiscal resources
- -Enhancement of environmental values, and limitation of adverse environmental effect.

Criteria

The ultimate regional arrangement must attain a series of attributes that will enable it to perform these fundamental operations. The arrangement will desirably keep to a minimum the required number of institutional changes, so that it will be capable of early implementation. By 1980, New York City, Nassau County, and Westchester County will have a combined deficit of 170 MGD. Therefore, the recommended regional arrangement must be able to gain acceptance, develop a staff, and organize the required activities as soon as possible. The urgency of the task, however, should not push the Region into an arrangement that would sacrifice other essential attributes.

The regional arrangement must be capable of flexibility, responding to longrun changes and continuously updating proposed plans. It must be compatible with the proposed engineering projects described earlier in this chapter, capable The region has open to it several al- of implementing all phases of the projternative paths to regionalization of its ects and operating them in an integrated water sources and capable of full implementation of all non-structural phases of the program. It also must be capable of settling disagreements such as have arisen between New York City and its wholesale water customers and people in its source areas.

Since the new regional arrangement must be able to wholesale its water in an efficient and orderly manner, it must be capable of promoting county initiative. The counties, as well as New York City, are the logical buyers from the regional supply. Yet, in most counties the water supply arrangements are confused and disorganized. The regional arrangement will, therefore, have to encourage stronger county roles.

The new regional arrangement will be charged with the fair distribution of water and must, therefore, be capable of recognizing the location of need throughout the region, and long-term changes in these needs. Moreover, it must be both legally and politically feasible. It must be able to acquire the necessary legal power to fulfill its responsibilities, such as authority to develop new

The capital requirements of the recommended projects for the region will be great. Thus, the preferred institutional arrangements should offer an adequately broad financial base from which to gain capital and equitably distribute the debt obligation.

Finally, the new regional arrangement must be environmentally responsive: Capable of constant review of water consumption trends and possible environmental disruption from its developments, capable of instituting universal metering and other measures to reduce water consumption, and capable of reviewing emerging water supply technology.

Alternative Futures

One possible route for future water supply matters is, of course, simply the continuation of existing arrangements, in which local water suppliers are respon-

sible for local needs. New York City would maintain its quasi-regional responsibilities. This "solution" of "muddling through" would minimize immediate costs and legal changes, but could prove disastrous. Certainly, Nassau County which is running out of potable water would receive no relief. The problems of upstate counties, some of which depend to a great extent on the New York City system for water, would be unresolved. And New York City itself would find it difficult to obtain permission for additional water supply upstate. In fact, this alternative meets almost none of the attributes described above as important to a new institutional arrangement for the region. The alternative of "muddling through" must be discounted.

A STATE OF THE PARTY OF THE PAR

Other alternative paths, which generally propose regionalization of the water supply services, essentially boil down to four possibilities.

One of these is to expand the New York City system into a true regional supplier. The New York City system would be given authority to construct withdrawal, treatment and transmission facilities on the Hudson River as well as power to effect, in conjunction with the State Department of Transportation, the enlargement of Hinckley Reservoir or the reregulation of Sacandaga Reservoir if proved necessary. It would assure transmission capability for upstate water to Nassau County. The Water Supply Act of 1905 would be amended so that New York City would have both the responsibility and authority to provide required water to municipalities, preferably county water agencies and districts, in all of the eight outlying counties. These counties would be given representation in the New York City system's policy-making ac-

This arrangement would significantly advance the current situation toward genuine regionalization. In fact, given the demonstrated technical capability of the New York City system, this alternative satisfies many of the essential attributes cited earlier. However, it falls drastically short in terms of political acceptability and accountability. The history of water supply in the region makes it highly unlikely that New York City will yield equal decision-making voices to other counties

in the region, or that the upstate counties will yield to New York City ultimate authority over their water supply needs for the next 50 years. It is difficult to envision the City system, with its needs, planning fairly for other than itself, or for the outside areas to give it the authority to do so.

An alternative to New York City as a genuine regional supplier would be for * the region's additional needs to be met by either the State or the Federal Government. Either would develop a new water source on the Hudson River and would provide in the future for supplementing that river's flow. The State or Federal Government would also have the responsibility for operating such facilities and for assuring transmission capability throughout the region. New York City would continue to operate its existing

This alternative would bring to bear the considerable financial resources and technical capabilities of these levels of government, and would dampen suspicions of bias toward either New York City or the outlying counties. At the same time, however, this path to regionalization takes water supply decisions farther from the population being served than necessary. Questions of accountability would almost certainly render this alternative politically unacceptable. Water supply has traditionally been a local matter, and it should be kept as close to that level of government as possible while still meeting future needs. Moreover, this alternative poses the potential problems of inequity and administrative confusion, which might accompany an arrangement that calls for two essentially separate regional water supplies (one, the new supplies of the State or Federal Government, and the other the existing upstate supplies of the New York City System). The problem would be most acute if the price structures of the two supplies differed.

Alternatively, it is possible that a State agency be designated to handle the region's water supply needs, both future and existing, and be responsible for wholesaling water to county water agencies. Again, however, a State agency is further removed from its customers than necessary. In addition, particularly in light of the lack of State water resource planning activity in the region, it is possible that the State-wide responsibilities of a State agency would dilute its efforts in southeastern New York. Moreover, if an existing State agency were designated to develop and operate new water supplies, such authority might

It is estimated that residential domestic consumption from public supplies in the southeastern New York region averages about 65 gallons per capita daily and accounts for 46.7 per cent of the total consumption in the region. This includes water for in-house uses such as drinking and cooking, bathing and personal use, laundry, and toilet flushing. Recognizing this rather large segment of consumption, water professionals and conservationists have explored the possibility of reducing total consumption through a more efficient use of household water.

For example, the water required for toilet flushing alone averages about 30 gallons per capita daily, and uses 350 million gallons per day from public water supplied in the region. This is a significant share of the total consumption and is that portion of domestic consumption which could perhaps be most easily reduced. To this end, some groups have encouraged consumers to place bricks in the bottom of their toilet tanks to reduce the amount of water used each time the toilet is flushed. A more elaborate approach would be to install toilets which are designed to use less water. Such water saving toilets are now available and use only about 60 per cent of the water used by conventional

Another large area of in-house water use is bathing and personal use, which accounts for about 30 per cent of domestic in-house consumption. It has been estimated that 60 per cent of the water for personal hygiene is for showers or about 9 per cent of the total domestic consumption. There are available shower heads which could save up to half the amount of water used for showers.

Laundering also uses large amounts of water and amounts to about 20 per cent of the total in-house consumption. There are automatic washing machines which would be able to reduce the amount of water required for laun-

If all these water-saving devices or improved appliances were installed in all the houses in the region, it would be possible to reduce in-house consumption by up to 15 gallons per capita daily. This would be a reduction of ten per cent of total water needs. However, it would be extremely difficulty to realize this total reduction all at once. First of all, there must be adequate incentive for

consumers to install water-saving devices and special appliances. The incentive could come from a greater price for water. In southeastern New York, however, there would have to be an inordinate increase in the price before all consumers would replace their existing equipment at this time.

It seems more hopeful to expect a long term response by consumers. That is, it seems more likely that reductions will occur gradually through a long period of time as existing equipment needs replacement or new units are built. An immediate reduction in water consumption is extremely unlikely and the forecasted deficits for the region should not be reduced.

This is not to say that water saving devices should not be encouraged. Consumers should be told that when and if it becomes necessary to replace existing equipment or in any new installations, water saving devices should be used. To promote the newer designs, there should be changes in the building codes, there must be universal metering, and there should be a public education campaign. With all this, the water use reduction will be small and gradual but should definitely be encouraged.

WATER PRICING

10. Water pricing to possibly influence consumer consumption should be investigated for possible use in the region by water purveyors. It is recognized that water is not a free market good as pricing policy is constrained by regulatory requirements. However, to the extent that discretion is allowed, pricing mechanisms (through the use of penalties for excessive consumption as an example) may be of value in reducing demand. Universal metering is a necessary precondition for use of a pricsumption.

The price for water charged by water utilities in the southeastern New York region are generally designed to meet the costs of supply. These costs include the capital costs of the system, operating costs, personnel and management costs. The utilities have generally been success-

In addition to a price designed to meet the supply costs, it has been suggested that water pricing be used to manage the amount of water demanded by consumers. It has been argued that by regulating the price for water it is possible to effect the total amount of water required. This is particularly true for large water uses such as lawn sprinkling, car washes, and some industrial applications. By affecting the level of consumption, pricing could be a management tool for the utility.

However, it is thought that the effect of greater prices for water would not have a significant effect on total water needs in the region. In a Commission study it was estimated that a 50 per cent increase in the price of water would reduce average consumption by approximately five per cent. Pricing would have a more pronounced effect on peak needs but this Commission is concerned with average regional needs. Peak needs are essentially a distribution problem, not a supply problem. Because pricing can affect peak needs it should be further explored as a management tool for

There is some question about how increased water supply prices would be instituted on a regional basis. Presently, the New York State Public Service Commission regulates the prices which may be charged by investor-owned water companies. The price is generally limited to a price which includes the cost of supply plus some fair return on investment. The PSC limits on water rates do not allow for prices high enough to affect demand. For non-investor owned water utilities, or those utilities owned by ing mechanism to effect con- municipalities, there is no state agency which regulates water rates. Consequently, some village and city systems view water supply as a revenue raising device. Others, however, run deficits or break even.

The effectiveness of pricing to influence consumer demand in New York City is limited by the fact that the ful in meeting these costs through the City does not have universal metering. Presently consumers pay on a flat rate



Photo courtesy of New York Times

In the counties outside of New York City, it was found that leakage from distribution networks is on the order of ten per cent. It is possible to define leakage in these areas because most of the public water supply systems have universal metering, which measures all the water entering the distribution network. This level of leakage is consistent with the experiences of distribution systems around the country. It is a very acceptable level of distribution leakage and reflects a fairly good level of system management. This record should be encouraged and continued.

Unfortunately, in the area of highest water use in the southeastern New York it is not possible to define how much leakage is occurring. This is because there is no universal metering in New York City. Without universal metering it is only possible to make gross estimates of leakage. These gross estimates run from a low of 3 per cent up to charges that the City is losing one third of the amount supplied through leakage.

The charges of high leakage are reenforced by that fact that New York City does not have a continuous ongoing leaks detection and repair program. In 1968 the leak detection personnel were integrated into the other branches of the Bureau of Water Supply. The present program is to repair leaks only after they are detected and reported to the City. Quite often the leaks are detected when they cause flooding or the pavement collapses.

A two pronged attack should be initiated. The first step is to reestablish a leak detection and repair crew. The second step is universal metering. Until universal metering is initiated, the actual leakage will remain an unknown and the City will continue to be exposed to charges of high leakage.

WATER SAVING APPLIANCES

9. The use of water saving toilets, shower heads and appliances should be encouraged. Over an extended period of time up to 15 gallons per capita per day could be saved. Requirements for water saving appliances should be incorporated into building codes to cover new and renovated buildings.

well conflict with the agency's present regulatory powers.

The fourth regional alternative is a regional corporation, which would have overall responsibility for the production of sufficient water to meet the water supply needs of the region. It would be given authority to build and operate withdrawal, treatment and transmission facilities on the Hudson River as well as enter into an agreement in the future with the State Department of Transportation for expansion of Hinckley Reservoir or changes in the operating regimen of Sacandaga Reservoir for flow augmentation on the Hudson. Furthermore, it would be given authority to take over the existing upstate reservoirs, treatment plants and aqueduct system of New York City. It would operate the existing system and the new facilities as one unit. So that such a regional institution would not be bogged down in selling water to more than 600 separate water supply systems in the region, its responsibility would be to provide county water agencies and New York City with the needed water. They, in turn, would deal with local suppliers.

This alternative, which would incorporate the voices of the different areas of the region into the decisionmaking process, is a balanced compromise. It creates an agency large enough to coincide with the regional nature of water supply but not so far removed as to eliminate local control. It avoids the City-centured focus of New York City as regional supplier and the loss of local initiative inherent in a State or Federal take-over. It alone among the alternatives provides the basis for effective regional leadership in implementing the broad spectrum program needed to adequately respond to the water supply situation in southeastern New York.

A regional agency designed around the needs and characteristics of the southeastern New York region would be capable of a flexible response to changing needs. By including the existing regional facilities into the corporation, the new projects could be integrated into the existing system to maximize efficiency. If the regional corporation includes representation from the counties and City, there would be a forum for cooperation, and the required

county initiative would be promoted. The corporation would have a large and equitable financial base.

It is recognized that a corporation would require transfer by the City of New York of the rights to upstate water supply which they have had for many years. This may cause some delay in implementation and affect the corporation's political acceptability. However, in comparison with the other options, this program least violates the essential attributes of a regional arrangement and has the greatest chance of success.

TABLE 5 EVALUATION OF ALTERNATIVE FUTURES ACCORDING TO CRITERIA

CODE

+ Program satisfies criterion

0 Program has neutral or acceptable effect on criterion

Program violates criterion

	No Change "Muddling Through"	New York City as Regional Supplier ²	State Development of New Supply ³	Federal Development of New Supply	State to be Regional Agency ⁵	SE Water Facilities Corporation
Minimize Required Changes	+	+	+	_	0	0
Capable of Early Implementation	0	+	+	_	0	0
Capable of Flexible Response	-	+	+	+	+	+
Engineering Compatibility	-	+	_	-	+	+
Capable of Settling Disagreements	_	0	_	_	0	+
Promote County Initiative	_	-	0	0	+	+
Distribution of Needs	-	+	0	0	+	+
Legal Feasibility	+	+	+	+	+	+
Political Acceptability	-	_	-	-	_	0
Financial Capability and Equity	-	-	+	+	+	+
Environmental Responsiveness	-	0	_	_	+	+

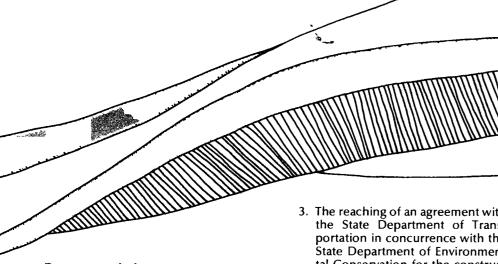
¹Maintaining existing arrangements, or "muddling through."

²Expansion of New York City system into genuine regional supplier.

³State development and operation of new regional supplies, with existing regional facilities continued to be run by New York City.

Federal development and operation of new regional supplies, with existing regional facilities continued to be run by New York City.

State to develop and operate new supplies, and take over existing regional facilities.
Regional corporation to develop and operate new supplies, and take over existing regional



Recommendation

In any evaluation process, the maximization of one criterion may detract from another criterion. The Commission believes, however, the alternative which best meets all the criteria as a whole is a Regional Corporation. It would respond to the region's water needs in an equitable and efficient manner while remaining accountable to local forces. By placing the region's water supply considerations within the framework of a single system that can respond to the region's needs in a comprehensive way, balancing the needs of the service area against those of the source area, the needs of users against those of the environment. environmental responsiveness would be enhanced.

It is thus recommended that a regional Southeast Water Facilities Corporation be established by special act of the legislature with an effective date of April 1,

Implementation

To assure a smooth transition from present arrangements to the Corporation, an implementing agency should be created by the legislature effective April 1, 1974. Among the implementing agency's tasks will be to provide a decision-making forum for the affected local agencies to carry forward the plans recommended by the Commission, to pursue necessary State legislation, and to continue discussions with present water supply agencies which might lead to transfers of personnel to staff the new regional authority.

Once the corporation is established, its responsibilities, some of which have already been mentioned, will include:

- 1. The acquisition of the New York City reservoir and transmission facilities located north of the City as soon as possible.
- 2. The design and supervision of construction of new water supply facilities on the Hudson River at Hyde Park by 1985.

- 3. The reaching of an agreement with the State Department of Transportation in concurrence with the State Department of Environmental Conservation for the construction of additional capacity at Hinckley Reservoir, when and if needed.
- 4. The management, operation and maintenance of the new water supply facilities in an integrated manner with the existing regional sys-
- 5. The continued planning, in cooperation with the counties and New York City, to meet the region's changing water supply needs.
- 6. The wholesaling of water to the counties in the region through one service account for each county.
- 7. The encouragement of county water agencies to act as intermediaries between the Corporation and the local water utilities. Water suppliers on the local level would continue to construct, operate, and maintain their distribution systems. They would continue to use their local sources but would turn to the Corporation through the county for needs beyond local capacity.
- 8. The development of a comprehensive public education program in cooperation with the local school systems and news media.
- 9. The implementation of conservation measures, including universal metering throughout the re-
- 10. The provision of transmission capability to Nassau County and Long Island, and further study of the feasibility of integrated operation of the ground and surface water resource.
- 11. The encouragement of the development of local projects where indicated.
- 12. Cooperation with Nassau County, in the development of recharge fa-
- 13. The development and implementation in cooperation with the Federal and State governments of an

expanded research program in emerging water supply technology.

It is envisioned that both the recommended program and the regional corporation can be developed in stages. The necessary activities in the region through 1985 are outlined below:

PHASED DEVELOPMENT OF THE **CORPORATION THROUGH 1985**

- 1974—Implementing Agency created with representation from New York City and the counties of the southeastern New York region and source areas. This Agency should be funded by the State. The Southeastern **New York Facilities Corporation** created with an effective date of April 1, 1976.
- 1976-The Southeastern New York Water Facilities Corporation established and key personnel hired. The Authority should begin to update and revise the recommended plans of the Southeast Water Supply Commission. Land acquisition for the Hudson River facilities at Hyde Park to begin. Begin design of the Hudson River withdrawal, pumping and treatment facilities and the aqueduct from Hyde Park to West Branch Reservoir. Enter into a contract with New York City to insure adequate transmission capabilities to Nassau County. Initiate universal metering in New York City.
- 1976-The initiation of action programs relative to conservation measures, modification of excess releases, public information and education, local projects, recharge facilities, and research.
- —The upstate reservoir and aqueduct facilities of New York City up to Kensico Reservoir or up to the City line in the Croton System to be transferred to the Corporation to assume operations and water sales.
- 1980-Begin construction of Hudson River withdrawal, pumping, and

duce the amount of water required for New York City.

In order to estimate the capabilities of universal metering in New York City the staff of this Commission performed a computer analysis which compared water consumption per capita in metered cities to the per capita consumption in nonmetered cities. They took a sample of 29 cities, metered and unmetered, and varying in size from three million down to a quarter of a million. The results of this computer analysis demonstrate most definitely that universal metering results in reduced consumption per capita. On the basis of this study it was concluded that universal metering in New York City would reduce anticipated consumption by approximately 15 per cent. With universal metering water consumption in the City by 2020 would be reduced by 240 million gallons per day.

The cost of universal metering in New York City would, of course, be substantial. It has been estimated that it would cost on the order of one hundred million dollars to install meters on all the presently unmetered services in New York City. In addition to this cost there would be annual costs for meter readings, for billing operations, and for the maintenance and servicing of meters. The total annual costs, including debt service for universal metering would be about nine million dollars. This is a high cost, but it is estimated that every million gallons of water saved would cost only \$110. This compares to a cost of over \$350 per million gallons for water supplied by a project alternative. Universal metering would be able to reduce consumption at a cost one third of supplying the same amount of water with a new project. If the possible environmental impacts of a new project are included, the cost disparity is even greater.

The Southeast Water Supply Commission has recognized these arguments for universal metering. Based on the fact that universal metering has been studied and recommended many times in the past, recognizing that the advantages to be gained far outweigh the disadvantages, because of the total effect on the water resources investment in the

southeastern New York region, and because of its economic efficiency, the Commission has strongly recommended that a program of universal metering be initiated in New York City. This metering program should be accomplished in a ten year period starting in 1975.

To this end environmental conservation the law should be amended to require metering of water supply customers or a plan to meter as a necessary precondition for consideration of applications of approval of new sources of water supply. A section should be added to the environmental conservation law requiring the installation of water meters in community water supply systems serving 1,000 or more people in the southeast region A section should be added requiring consumer water metering as a condition for grants and assistance and for the issuance of an outlet permit for waste disposal works.

LEAKAGE CONTROL

8. A regular leakage control program nity water supply systems. Surveys to reduce total water consumption.

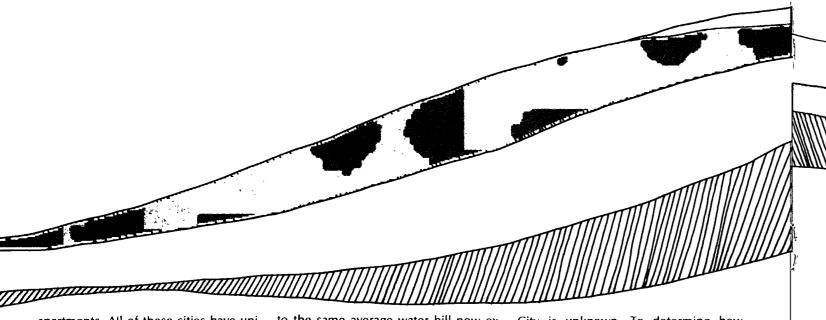
and field investigations on a regular basis are essential, as opposed to a breakdown program which is based on main breaks, pressure drops, localized flooding or pavement collapse. This would also put leakage control on a systematic basis and eliminate speculative assessments.

A necessary pre-condition for an effective leakage control program is universal metering. This pinpoints areas of changing water demands, allows detailed system analysis, locates leaks, and provides a continuous record and audit of the water furnished and consumed in the distribution system

Leakage is defined as the water that is lost from the distribution mains and laterals of a water supply distribution network. This area of water consumption was studied to determine whether it should be established for all commu- could be economically reduced in order



Photo courtesy of New York Times



apartments. All of these cities have universal metering. They all have lower per capita domestic consumption than does New York City.

It has been demonstrated in New York City itself that large apartment concentrations do not detract from the efficiency of metering. In a study done in 1939 and 1940 it was found that in apartment buildings with metering, the average per capita consumption was 54 gallons per day. At the same time, in unmetered apartment buildings consumption was 89 gallons per capita daily. This study plus the experience in other cities demonstrates that although there are high apartment concentrations, universal metering will be effective in reducing consumption.

One of the arguments against universal metering in New York City is the feeling that metering would result in a high cost of water for consumers and would, in fact, be a form of a regressive taxation. However, it need not follow that universal metering result in higher water costs. The amount of water a family uses for domestic purposes is comparatively small. For the average family of four in New York City the cost of water with universal metering would be approximately \$80 per year. The present cost for water for the average family of four is about \$60 per year. That is, in going from the present unmetered situation to a metered basis, the cost of water would increase \$20 per year for a family of four. This assumes the same meter rate now charged industrial consumers in New York City. If desired, a lower meter rate

'Most residential consumers are apartment age rate revenues divided by the population a family of four using 80 gpcd billed directly would be \$80 per year. This present annual cost for a family of four based on total frontage rate revenues devided by the population served is \$60. For a family in a single family dwelling the average frontage rate cost is \$99 per year.

to the same average water bill now experienced with the flat rate basis.

As discussed in a following section on water pricing, it is absolutely necessary to have universal metering before any sort of rational pricing scheme can be instituted in New York City. By paying for water on a flat rate basis consumers pay the same amount no matter how much water they consume. To charge them in proportion to the amount of water consumed, universal metering is essential. With universal metering it is possible to have any pricing scheme which may or may not increase the cost of water above the flat rate. Even if it is decided that the average cost of water to the average consumer remain where it now is, universal metering would be effective in reducing consumption. This is because the consumer would finally pay for water wasted and would have some incentive to reduce waste and reduce his water bill.

Universal metering is necessary to insure that the users who use most of the water pay for it. In the present situation 25 per cent of the consumers, the industrial and commercial services, pay for water on a metered basis while the remaining consumers pay on a flat rate basis. This results in a situation where metered consumers pay 40 per cent of the total revenues and consume only 25 per cent of the amount supplied. Universal metering could, if desired, reduce this disparity and allocate costs in a more equitable manner.

Universal metering's greatest effect in could be charged domestic users leading New York City would be to reduce waste and leakage. Waste is defined as the water which is lost inside a customer's building through leaky fixtures or plumbing. Universal metering, by putting a penalty on this waste, would promote the necessary repairs. It would also help to reduce leakage. Leakage is the water lost from the distribution network of a water supply system. The amount of

City is unknown. To determine how much water is lost, universal metering is necessary. It would make it possible to account for all the water entering the City. By knowing exactly where the water is going and who is using it, it would be possible to isolate the areas of the City with the greatest amount of distribution losses. This would expedite leak detection and repair.

The effect of universal metering in reducing leakage and waste has been demonstrated in Philadelphia following universal metering in that City. Before and after metering the Philadelphia Water Department surveyed a residential area of the City. Leakage and waste decreased by approximately 30 per cent after meters were installed. Operators in the City of Philadelphia have stated that in areas where meters did not exist leaks on service lines were allowed to go unrepaired for long periods of time and waste inside the building was disregarded. After metering these leaks were minimized and waste reduced. There is no doubt that universal metering in New York City would lead to the same type of experience.

In addition to these arguments, there are many more in support of universal metering. Universal metering would make it possible to account for all water uses and thereby assist in planning for expanded water services. In cities which have gone to universal metering the rate at which water consumption per capita increases is decelerated. Universal metering, by making it possible to account for all water uses would also assist in planning for sewering services.

Because of the recognized advantages of universal metering water professionals and conservationists have, for a long time, promoted universal metering in New York City. These groups include the Delaware River Basin Commission, some of the state agencies, and numerous conservation groups. These groups water lost through leakage in New York recognize that universal metering will retreatment facilities on Hudson River at Hyde Park and aqueduct from Hyde Park to West Branch Reservoir. Reassess regional water needs and programs.

1985-Complete universal metering program in New York City. Complete construction of Hudson River facilities at Hyde Park and aqueduct from Hyde Park to West Branch Reservoir. Begin operation of new facilities in a flood skimming pattern in conjunction with existing regional system. Reassess regional water needs and programs.

Financing

Funding from the State to staff and operate the implementing agency, and to initiate operations of the corporation will be necessary. Once the corporation has acquired the New York City facilities and has begun to wholesale water, it will be self supporting. The transfer of New York City's existing upstate reservoir and aqueduct facilities-properties that already belong to the public-will not involve sale and purchase, but merely a change in administration. The corporation will assume obligation for the outstanding bonded indebtedness for these facilities.

Wholesale water sales by the corporation to the counties and the City will meet operating costs. The counties and localities, including New York City, will still have control over retail sales and should not experience loss of revenues. Those jurisdictions which received revenue from taxes on the New York facilities will receive equal payment in lieu of taxes from the regional corporation. Table 3 indicates the annual costs that must be met by the new Corporation.

The corporation's capital costs for the design and construction of the proposed Hudson River facilities will be met through the issuance of revenue bonds. The anticipated capital costs are shown in Table 4.

TABLE 3

ANNUAL COSTS OF SOUTHEASTERN NEW YORK WATER FACILITIES CORPORATION (IN MILLION DOLLARS)

On Existing Facilities	
Operation and Maintenance	16.74
Taxes	12.5
Debt Service	36.9
Subtotal	

On Proposed Facilities¹ Hyde Park Flood Skimming to West Branch **Expansion of Hinckley Reservoir. Sustained** Withdrawal at Hyde Park to Kensico Reservoir 27.2

Subtotal

¹Includes operation and maintenance expense, taxes and debt service.

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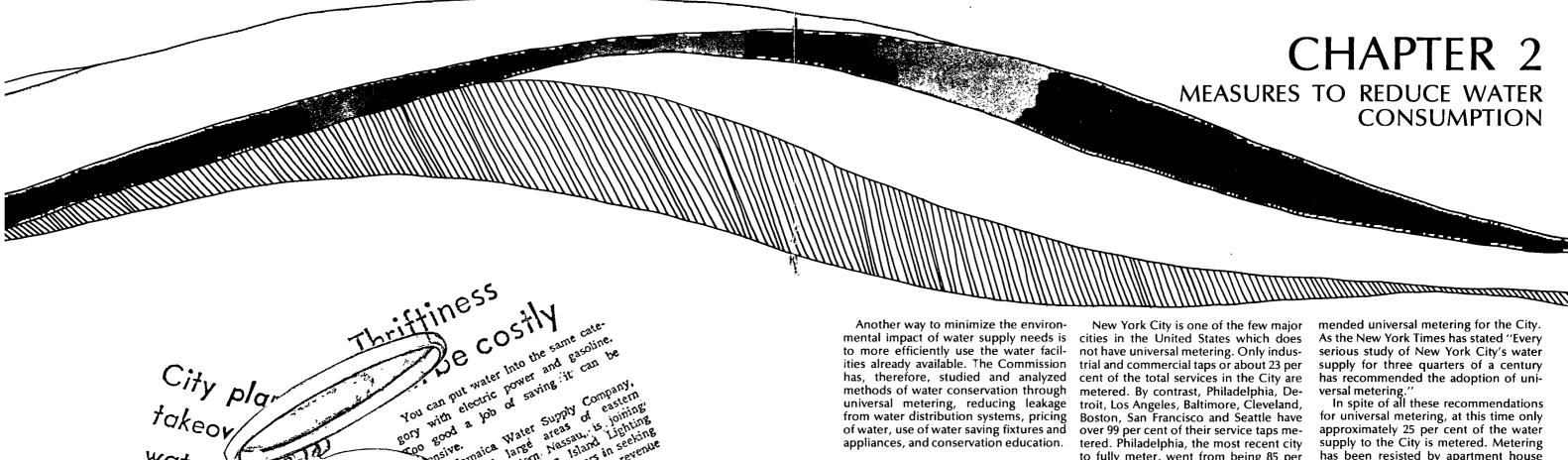
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TABLE 4

TOTAL CAPITAL COSTS FOR NEW CONSTRUCTIONS (IN MILLION DOLLARS)

	Hyde Park Diversion	
,	Floodskimming to West Branch Reservoir	Expansion of Hinckley Reservoir, Sustained Withdrawal to Kensico Reservoir
Construction Costs		
Reservoirs		45.7
Intakes	7.5	_
Treatment Plants	98.7	_
Transmission Lines	254.0	182.4
Pumping Plants	31.3	4.3
Engineering and Contingen	cies 97.9	58.1
Land	2.7	22.0
Legal and Administrative	49.2	31.3
TOTAL CAPITAL COSTS	541.3	343.8
CUMULATIVE	541.3	885.1

1Proposed Water Supply Projects for Southeastern New-York, Southeast Water Supply Commission, June 1, 1973. Costs based on an ENR of 200.



mental impact of water supply needs is cities in the United States which does to more efficiently use the water facilities already available. The Commission has, therefore, studied and analyzed methods of water conservation through universal metering, reducing leakage from water distribution systems, pricing of water, use of water saving fixtures and appliances, and conservation education.

CONSUMER METERING

- 6. Every consumer from a major community water system in the southeast region should be metered. Such action will reduce water consumption an esmostly in New York City and provide system operators with an essential management tool in controlling leakage and unaccounted-for water, and in establishing fair and equitable rate schedules. Appropriate legislation should be enacted at the state level to require metering of the remaining unmetered services.
- 7. Universal consumer metering should be initiated in New York City. This course of action has been recommended for the last century and is fully justified to improve efficiency, reduce water consumption, reduce wastage and to raise management effectiveness.
 - A detailed plan and implementation program should be developed to meter the remaining unmetered services by 1985. This should be mandated by state legislation.

Among those counties in the southeastern New York region outside of New York City, universal metering is fairly general practice. For the eight counties not including New York City approximately 92 per cent of the consumers are metered. In glaring contrast to this record, New York City does not have universal metering.

not have universal metering. Only industrial and commercial taps or about 23 per cent of the total services in the City are metered. By contrast, Philadelphia, Detroit, Los Angeles, Baltimore, Cleveland, Boston, San Francisco and Seattle have over 99 per cent of their service taps metered. Philadelphia, the most recent city to fully meter, went from being 85 per cent metered in 1954 to universal metering by 1958.

Metering in New York City has in the past been thoroughly considered and discussed, and often recommended. Metering has been an issue for at least a timated 240 million gallons per day century and was recommended in an editorial in the New York Times printed on October 9, 1860.

> "Our present system of water rates offers no possible check to any amount of waste. Charging people for water by the size of their dwellings, furnishing them facilities to draw thousands of gallons a day, and then charging them for as many hundreds, because their houses occupy a certain number of cubic feet of space, is as absurd as it would be to charge them for gas in proportion to their age or complexion.

"The only reasonable method of preventing waste is to charge each house with the water which goes into that house, and the only possible method of ascertaining this quantity is to measure it, or rather, let it measure itself, like gas, by passing through a meter. Then the amount of water that people are willing to pay for will be a very delicate test of what they want to use."

Since this editorial was printed over a century ago, there have been any number of studies addressed to the question of universal metering in New York City. In the last 25 years alone, there have been approximately eight studies or committee reports which have recomAs the New York Times has stated "Every serious study of New York City's water supply for three quarters of a century has recommended the adoption of uni-

versal metering."
In spite of all these recommendations for universal metering, at this time only approximately 25 per cent of the water supply to the City is metered. Metering has been resisted by apartment house owners, by private home owners and by some elected and other public officials. The argument these opponents have used against metering are based upon the apparent uniqueness of New York City, the supposed ineffectiveness of reducing its consumption through universal metering and sometimes the philosophy that water should be a free public good.

Metering opponents point out that 87 per cent of the people in New York City live in apartment buildings or multi-unit structures and only 13 per cent of the residences are single family homes. It is argued that with this housing concentration there are no large lawn areas to be watered. Lawn sprinkling is one of the uses of water most affected by universal metering. Moreover, because of the housing concentration most of the consumers in the City would be buffered from universal metering. The owner of an apartment building would be billed directly on a metered basis and would no doubt notice the presence of a meter. Individual tenants, however, would be buffered from the meter and would continue the same water use habits they now have.

The arguments against metering based on housing concentration ignore the fact that there are other major cities with universal metering which also have fairly high residential concentrations in apartments. Seventy-four per cent of the housing units in Philadelphia, 56 per cent in Cleveland, 83 per cent in Boston and 63 per cent in San Francisco are

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